Adverse Selection and Moral Hazard in Group-Based Lending: Evidence from Eritrea

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Contents

Chapter 1 Introduction

1.1 Aim of the study

Development economists and policy makers generally identify access to credit as one of the main determinants of economic activity and alleviation of poverty in developing countries. By having access to credit the poor may acquire productive capital to improve their capacity to generate income, savings and investment (Tang, 1995). However, in practice the poor in developing countries have very limited access to formal sector credit.

There are many reasons why the poor in developing countries' are not gaining access to credit from formal financial institutions. To start with, formal financial institutions in developing countries are characterized by persistent market imperfections, resulting from problems associated with adverse selection, moral hazard, and enforcement. In addition, credit markets in these countries are hampered by a lack of suitable collateral and difficulties in enforcing loan repayments (Besley, 1994).

Recently, new institutions – referred to as microfinance – are flourishing in developing countries to provide credit to the poor microentrepreneurs of these countries. Broadly defined, microfinance refers to the provision of financial products to low-income borrowers who do not have access to loans from established formal institutions. The term microfinance embraces different forms of microlending, the most famous institutions being the Grameen Bank of Bangladesh, the Bancosol of Bolivia, and the Bank Kredit Desa of Indonesia. These institutions have already shown success in being able to reach the poor and realizing high repayment performance.

Microfinance institutions can be broadly categorized into two groups: those engaged in providing loans directly to individual borrowers, and those providing loans only to individuals who organize themselves into groups, which are known as solidarity groups, i.e. group-based lending.

Grameen Bank and Bancosol are examples of the so-called group-based lending institutions, whereas Bank Kredit Desa of Indonesia provides loans directly to individuals. In group-based lending, borrowers have to organize themselves into groups and become jointly liable (the joint liability principle) for the repayment of their loans in order to acquire loans from microfinance institutions (MFIs).

Most existing literature tries to explain the success of group-based lending. Economists have developed theoretical models that explain this success by showing that group-based lending mitigates the asymmetry of information problems of financial markets, such as adverse selection problems, moral hazard, and enforcement problems (Stiglitz, 1990; Besley and Coate, 1995; Ghatak, 1999). Firstly, groups are formed on the basis of a self-selection process of members. To this end group members screen the behavioral integrity and creditworthiness of each other before they form a group. Thus, screening by group members may help to mitigate the adverse selection problem of financial institutions. Secondly, once groups have been formed, members agree to monitor each other's economic activities. Through this monitoring process, they may be able to mitigate the moral hazard problem. Finally, once individual members' output has been realized, group members may enforce repayment against defaulting members for which they may use social sanctions and pressure mechanisms. Social ties and connections among members play a role in facilitating the screening, monitoring and enforcement process. Thus, according to the theoretical literature the three problems related to asymmetry of information of formal financial institutions – i.e. adverse selection, moral hazard and enforcement problems – can be alleviated by group-based lending mechanisms. Yet, there are very few empirical studies to verify the claims of these theoretical models

This thesis contributes to the joint liability lending literature by carrying out empirical studies that investigate whether these theoretical claims also hold after empirical scrutiny. To be more precise, these studies analyze a number of issues that have remained largely untouched by previous empirical studies.

First, the thesis investigates the impact of differences in behavior of different types of group members on the performance of groups. In most group-based lending programs, groups have to elect a group leader after the group is formed. In the thesis, we particularly look at differences in *monitoring activities* and *social ties* of group leaders versus other group members and analyze their impact on reducing moral hazard behavior within groups. Moreover, we investigate whether differences in monitoring activities and social ties of group leaders versus other group members matter when it comes to the repayment performance of groups. As far as we know, our research is the first attempt to empirically investigate differences in behavior of different group members and their effect on group performance.

The second issue we discuss is associated to the problem of *adverse selection* and the related *screening activities* of group members. In particular, we look at the group formation process and investigate whether group members match homogeneously or heterogeneously in risk. To the best of our knowledge, this issue has been addressed in only one other study, which dealt with group-based lending in Latin America (Sadoulet and Carpenter, 2001).

The empirical studies use data of group behavior from two group-based lending programs in Eritrea. During the year 2000 we issued a questionnaire that contained several questions on, among other things, the screening, monitoring, enforcement and social ties of 351 individuals who were members of 102 different groups. The complete list of questions can be found in the appendix to this thesis.

1.2 Outline

The remaining part of this thesis is structured as follows. Chapter 2 provides an overview of microfinance approaches and their limitations. In this chapter we observe the similarities and differences between different microfinance approaches, as well as the characteristics of group-based lending programs and their restrictions. Before this is discussed, however, the chapter describes the segmentation of financial markets in developing

countries and the inability of these markets in reaching the microentrepreneurs of these economies. It further provides a discussion on the asymmetry of information paradigm as a rationale for the failure of financial markets.

The aim of chapter 3 is to provide an assessment of financial institutions in Eritrea. The chapter starts by illuminating the historical development of the banking system in Eritrea, followed by an overview of the role of the Eritrean financial institutions in the financial intermediation process in comparison with financial institutions of some other countries. The chapter also covers the operations and type of clients they serve, and discuses the limitations of each of the relevant formal financial institutions in Eritrea. Finally, the chapter discusses informal financial activities in Eritrea. The conclusion of this chapter is that the Eritrean formal and informal financial institutions are unable to provide the microenterprises in the country with sufficient capital to improve their capacity to generate income and profit.

Chapter 4 presents the two MFIs that operate in Eritrea. The chapter provides an overview of these institutions by illustrating their characteristics. It presents background information on how these institutions have started to operate in Eritrea. This is followed by a discussion of the organizational structure and objectives, strategies and group formation procedures of these institutions. The final section illustrates the credit-saving policies, methodologies and organizational structure, as well as the performance of the two institutions.

Chapter 5 describes the data collected from the two Eritrean MFIs. First, it discusses the survey procedure and data collection process. Next, it provides a statistical summary and illustration of the amounts of money borrowers in the sample received and the group savings they made. Moreover, it presents responses of borrowers on questions related to group formation, social ties and peer screening, group monitoring and enforcement mechanisms. Finally, it deals with data on a number of other variables.

Chapters 6, 7 and 8 are the empirical chapters of the thesis. Chapter 6 attempts to investigate the determinants of repayment performance of groups. Several theories indicate that repayment performance is related to the screening, monitoring and enforcement of group members. A number of earlier empirical studies show that repayment performance of groups is indeed determined by the screening, monitoring, and enforcement activities of its members. Some studies also show that social ties may matter. We extend the existing empirical literature by emphasizing that when analyzing repayment performance of groups, one should look at these activities as carried out by different types of group members. In particular, we investigate whether differences in monitoring activities of group leaders versus other group members make a difference for the repayment performance of groups.

Most empirical studies use data of one individual member as a representative of his group and test group repayment performance. In our analysis we use data of at least two group members: the group leader and at least one other member of the group. This permits us to separate the data into two parts: variables describing the activities and characteristics of the group leader, and variables that are related to members other than the group leader. Consequently, we are able to test whether there are differences with respect to the role of the monitoring activities and social ties of group leaders vis-à-vis these activities and ties of other group members in reducing repayment problems of groups.

We focus on the differences in behavior between the group leader versus the other group members because when we visited the group-based lending programs in Eritrea, we noticed that group leaders in the Eritrean MFIs did a lot of activities on behalf of the other group members. Therefore, we want to see whether their activities have a different impact on group performance as compared to the effects of the same activities yet done by other group members.

Chapter 7 elaborates on the results discussed in chapter 6. One of the determinants of repayment performance may be the extent to which group members show moral hazard behavior. Theoretically, moral hazard

behavior of group members has a negative impact on repayment performance of groups. The empirical analysis in chapter 7 provides an empirical analysis of the impact of peer monitoring and social ties of group members in minimizing moral hazard behavior among group members. Joint liability lending theories claim that peer monitoring by and social ties of all group members play a role in reducing moral hazard behavior by members. Individuals voluntarily get together to form borrowing groups and they promise to be jointly liable for each other. In order not to end up paying for a defaulting member, every member monitors every other member's investment behavior. Therefore, group-based lending delegates costly monitoring activities to group members, which may help lenders to reduce their lending costs and transfer these costs reductions to debtors by reducing interest rates.

While there are abundant theoretical studies on group-based lending and moral hazard behavior, there have been almost no empirical tests of this hypothesis. In this study we attempt to find out if peer monitoring and social ties play a role in mitigating moral hazard behavior among group members. In particular, just like we did in chapter 6, we focus on the differences between group leaders versus the other group members when investigating the impact of monitoring and social ties on reducing moral hazard within groups.

Chapter 8 analyses the group formation process. In particular, in this chapter we provide new insights into the empirical relevance of the homogeneous matching hypothesis in theoretical models of group-based lending. These models can be categorized into two groups. Most theoretical models of joint liability lending explicitly or implicitly assume that groups match homogenously in risk, which means that safe borrowers match with safe borrowers and risky borrowers match with risky ones (Ghatak, 1999). According to Ghatak (2000), homogenous matching among group members allows lenders to screen borrowers by the group members they choose. If a lender offers two contracts, one with high joint liability and a low interest rate and the other with low joint liability and a high interest rate, Ghatak's model shows that the safe borrower will choose the first type of contract and the risky borrower will choose the

latter. Homogenous matching thus allows the lender to identify the risk level of potential borrowers, which helps the lender to mitigate the adverse selection problem.

An alternative theoretical study by Sadoulet (1999) shows that groups match heterogeneously rather than homogenously in risk. Sadoulet claims that heterogeneous matching emerges as a rational response to missing insurance markets. The argument is that heterogeneous matching among members permits group risk pooling and creates insurance mechanisms in areas without insurance markets. An empirical study by Sadoulet and Carpenter (2001) on Guatemalan group-based lending confirms the heterogeneous matching hypothesis.

In chapter 8 we empirically test whether groups match homogeneously or heterogeneously in risk, taking the case of Eritrean microfinance institutions. It is important to investigate this issue. If our findings show that groups match heterogeneously in risk, rather than homogenously, then this may have adverse implications for the hypothesis that joint liability lending mitigates adverse selection problems, which, as is explained above, is generally assumed in most theoretical models.

Finally, chapter 9 provides a summary of the results of the empirical studies and presents some recommendations for further research.

Chapter 2 Microfinance: Approaches and Problems

2.1 Introduction

The aim of this chapter is to provide the reader with an overview of microfinance approaches and their limitations. Among other things we will observe the similarities and differences between different microfinance approaches. In addition to this, we will also see the positive characteristics of group-based lending programs as well as their shortcomings. However, before doing so we would like to clarify the theme by presenting the genesis of the present MFIs.

As will be illustrated in section 2.2 the financial market of developing countries is very much divided into two sectors: the formal and informal sector. Section 2.3 indicates that the formal sector has not been successful in providing financial services to the poor. At the same time the informal sector, despite being the major source of credit to the poor, has got its own limitations. Since the early 1950s international donors and governments have recognized the need for finance for the poor. Consequently, they endeavored to overcome the shortcomings of the two financial sectors by establishing development banks with the aim of supporting the poor with subsidized credits. This policy however had a poor success record.

Section 2.4 chronologically discusses how the different stances on the relationship between finance and on financial institutions for the poor have emerged and why all these views and relating institutions failed to eliminate the financial hurdles for the poor. Section 2.5, which is on the asymmetry of information paradigm, gives us the main rationales for the reason why the former views on finance and financial institutions failed.

The failure of the above mentioned financial sectors to serve the poor has made a number of theorists and practitioners look for alternative ways of providing credit to the poor to prevent more failure. They have been inspired by the indigenous informal institutions to design and establish a new generation of MFIs. The emergence of these institutions from the

ashes of the failed institutions and their promising performance in reaching the poor has inspired many donor institutions and development practitioners to replicate them in different parts of the developing world. Section 2.6 discusses the different approaches of microfinance that are being used in different parts of the developing world. Yet, recent research has also shown the limitations of some microfinance approaches, which will be discussed in section 2.7. Section 2.8 concludes.

2.2 Financial institutions in developing countries

The financial systems of most developing countries are characterized by the existence and operation of two financial sectors alongside each other, namely the formal and informal financial sectors (Germidis et al., 1991). The co-existence of these two sectors forces us to explore why they emerged in the first place. We need to understand the services they provide and their deficiencies and inefficiencies, before we discuss the MFIs, which are supposed to be an alternative to the above sectors in reaching the poor.

The formal financial sector, which consists of the central bank, commercial banks, development banks, saving banks, building societies, social security schemes, and insurance companies, is usually mainly active in the organized urban-oriented systems serving the monetized modern sector. In many cases the formal financial sector is an inheritance from colonial times or the result of imported systems.

On the other hand, the informal financial sector includes individuals such as moneylenders, relatives, friends, neighbors, landlords, traders, pawn brokers, etc., and groups of individuals (ROSCAs[1], mutual aid associations, saving clubs, etc.,) and deals with the traditional, rural, subsistence-oriented branch of the economy. It is characterized by a high degree of flexibility, its ease of transactions, and its emphasis on personal relationships.

[1] ROSCAs (revolving savings and credit associations) are defined as an association formed on the basis of a core of participants who agree to make regular contributions to a fund, which is given, in whole or in part, to each contributor in rotation.

In a number of countries we also observe the existence of financial institutions such as savings and credit cooperatives, and credit unions. They may be generally classified as “semi-formal” institutions as they have characteristics of both the formal and the informal sectors. Most of the time, they are not compelled by the countries’ banking laws and central banks’ regulations and supervision. They do not face, for instance, reserve requirement regulations and supervision by central banks. Yet, they are attached to the formal sector through their legal registration under the commercial laws of countries.

Two main opinions are forwarded to explain the existence of financial dualism in developing countries (Germidis et al., 1991). The first one argues that the existence of the informal financial sector is a response to the shortcomings of the formal financial sector due to various restrictions imposed by governments on the activities of such institutions. According to this view, governments through their central banks and treasuries impose restrictions such as interest and exchange rate controls and reserve requirements. The advocates of this argument consider these interferences by governments as financial repression and they promote financial liberalization, which involves the removal of all restrictions on the formal sector in order to reduce the activities of the informal sector (Krahnen and Schmidt, 1994).

The supporters of the second opinion argue that financial dualism in developing countries is explained more by the intrinsic dual economic and social structure in these countries and the rural population’s attachment to traditional values and norms (Krahnen and Schmidt, 1994; Christensen, 1993). They further argue that both in the economic and in the social sphere of these countries dualism can be observed and that financial sector dualism is a product of this rather than a cause. They advocate that even after financial liberalization there will still be an informal sector and they support more government regulation rather than liberalization in order to get credit to the poor.

Governments have passed laws and regulations to curb the informal financial sector activities – without much success. Based on this experience, the best thing governments can do is to analyze the two sectors and identify those areas where the formal and informal financial sectors are complementary and where they are substitutes. This may help to better connect both sectors. For instance, one solution might be to give or increase access of moneylenders, pawnbrokers, traders, etc., to the formal financial sector in order to enhance their ability to provide credit to low income households. Moreover, linking the traditional saving and credit groups such as ROSCAs to formal financial institutions can make savings of low income households safer and at the same time give the formal financial institutions access to low cost deposit capital of these traditional institutions (Christensen, 1993).

2.3 Access to loans for the poor from both forms of financial sectors

As mentioned in chapter 1 access to formal banking services is difficult for the poor. The main hurdle the poor have to take when trying to acquire loans from formal financial institutions is the demand for collateral (by these institutions). In addition, the process of acquiring a loan entails a lot of paperwork and many bureaucratic procedures, which lead to extra transaction costs for the poor. The impediments the rural poor have to overcome are even bigger, and formal financial institutions are not motivated to lend money to them. In general, formal financial institutions show a preference for urban over rural sectors, large-scale over small-scale transactions, and non-agricultural over agricultural loans. Only 5 per cent of the African farmers and about 15 per cent of the Asian and Latin American farmers have had access to formal credit, and on average just 5 per cent of borrowers have received 80 per cent of credit across developing countries (Braverman and Guasch, 1993).[2]

Formal financial institutions have little incentives to lend to the rural poor for the following reasons.

[2] The data cover the early 1980s (Braverman and Guasch, 1986).

- Small rural farmers often live geographically scattered in areas with poor communication facilities, making loan administration difficult. This inhibits the achievement of economies of scale for lenders as the market around rural offices is relatively small.
- Weather-dependent agricultural production is associated with exposure to systemic risk, such as drought and floods, which is reflected in a high covariance of local incomes.
- The absence of standardized information. Standard lending tools, such as financial statements or credit histories, do not exist in these areas.
- There is a possibility that repayment of working capital can be required only once, i.e. during the harvest season.

On the other hand, access to informal loans is relatively easy, convenient and available locally to low income households for the following reasons.

- Informal moneylenders use interlinked credit contracts to reduce default risk (development of business relationship with the clients).
- Informal moneylenders have local knowledge (information) to help them to appraise households' credit needs and creditworthiness (knowledge of the microcredit market).
- Informal moneylenders are willing to handle small amounts, which often meets the requirements and the capacity of clients.
- Informal moneylenders will profit from social sanctions such as those that may exist between members of a family. These sanctions may serve as a substitute for legal enforcement.
- Informal moneylenders use specific incentives to stimulate repayment, such as repeat lending to borrowers who repay promptly, with gradually increasing loan size.

Summarizing, flexibility of loan terms and adjusting loan management practices to the personal situation of the client are generally judged to be the most significant operational characteristics of informal financial institutions.

Despite the fact that many rural poor acquire their loans from the informal financial sector in rural areas of developing countries, the sector has some basic limitations. A common feature of many rural communities is that much of the local information does not flow freely; it tends to be segmented and circulates only within specific groups and networks (Robinson, 2001).[3] Usually the informal credit market is based on local economies and is thus limited by local wealth constraints and the covariant risks of the local environment. Poor communication of information in developing countries often limits the number of borrowers per lender and helps the lender to maintain high interest rates that are common to informal credit markets (Aleem, 1993). Every lender has only information on and influence on people in his vicinity. At the same time, he has a monopoly in this area and his clients cannot get loans from other sources. Moreover, since loans usually come from the lender's equity instead of third party depositors (savers), the amount available for loans is inelastic. Thus, informal credit market resources tend to be small, short–term, and restricted in space (Christensen, 1993). On the other hand, if the agricultural production increases and/or if there are innovations in the agricultural sector, the demand for loans will increase and the informal financial sector will not be able to satisfy this increase due to inelastic supply. In conclusion, informal financial institutions are limited in carrying out the standard functions of financial intermediaries.

To conclude, this section discussed the characteristics and shortcomings of the two financial sectors in developing countries. Their inability to satisfy the credit needs of the poor has recently led to a new financial innovation, known as microfinance. As will be discussed later, microfinance is believed to be able to reduce the above-mentioned inadequacies of formal and informal financial institutions and is emerging as an important credit partner to the poor in the developing world. Before we continue with a section on microfinance, we discuss the chronological stages that are passed before coming to the MFIs. In the following two

[3] In developing countries information flows are limited by poor communications, and gathering information is often costly. These poor information systems encourage segmentation of information, preventing informal lenders from scaling up their lending activities.

sections we discuss the different views with respect to setting up financial institutions to overcome the obstacles to provide credit to the poor.

2.4 The genesis of financial markets for the poor

Among development economists there has been much disagreement concerning the importance of finance for development. Much of the disagreement was due to different notions of what the term “finance” means (Krahnen and Schmidt, 1994). The field of finance includes the aspect of “capital”, that is, funds that are provided. A different notion of finance focuses on the financial system, which consists of financial institutions, financial markets and financial instruments, i.e. the process of providing financial services and the institutions involved in this process.

Starting from the years immediately after the World War II until the 1970s, development economists used to see development basically as synonymous with macroeconomic growth, and the factor input “capital” was seen as an important determining variable of output (income) (Rostow, 1960; Rosenstein-Rodan, 1961). Rostow, for instance, argued that increasing investment is crucial to economic growth, and at an early stage of development less developed countries are likely to face a domestic savings-investment gap. Since domestic savings in these less developed countries are inadequate to fund the desired level of investment to achieve a targeted growth rate, foreign capital is required.

The advocates of this view concentrated on capital (finance) and ignored finance as financial system (Chenery and Strout, 1966). However, they recognized that a mechanism was needed to distribute the foreign funds to run local projects. Yet, the existing local banks were either unequipped or unwilling to handle and appraise technically sophisticated projects. Hence, foreign institutions such as development finance corporations (DFCs) were set up to distribute financial resources to the selected projects. However, these DFCs were not financial institutions that performed all kinds of financial intermediary activities; they were simply administrative organs assigned to distribute foreign funds.

The advocates of this view were heavily criticized for their narrow definition of development as growth, and growth as the accumulation of capital (Krahnen and Schmidt, 1994). In addition, the returns to investment in large-scale prestige projects were often very low, as investments in activities with few linkages with the rest of the economy did not have very positive effects on growth (Mehmet, 1999).

In the 1970s, a second line of thought emerged after the world started to notice the failure of the view described above. The injection of foreign capital into big development projects failed to bring the expected economic growth in developing countries. The economic and social situation of the poor in these countries even started to deteriorate. Therefore, donors and policy makers began to change their general orientation. Development aid policy began to emerge as a social policy aiming at income generation, poverty alleviation, creating employment, etc. As a result of this change of policy a change of venue also took place. Instead of the macroeconomy certain target groups were now at the centre of attention, such as small farmers, microentrepreneurs, small holders, etc. (ILO, 1976; Streeten, 1979).

Despite the international donors' change in orientation and strategy, their understanding of finance remained the same as before. That is, finance provides capital in the form of credit to target groups. Even though these people required other inputs in addition to credit, credit was seen as the bottleneck.

When it came to actual disbursing the credit to the targeted groups of people, the existing commercial banks were found to be unwilling and unsuitable to act as intermediaries of capital between foreign investors or central governments on the one hand and domestic low income households on the other. Therefore, alternative institutions were needed, and this led to the establishment of specialized financial institutions for different target groups, such as development banks for small-scale industry, agricultural, housing, etc.

From the beginning, policy makers believed that the usual measures of profitability and efficiency could not and should not be applied to these financial institutions, and that these institutions, therefore, had to be subsidized in order to be able to survive. This is because the main recipients of the services of these institutions were assumed to be poor and involved in risky businesses. Therefore, according to the advocates of this view, loans with low interest were needed to stimulate target groups to approach these banks for loans.

A survey of the literature on the performance of these financial institutions shows that in general these subsidized financial institutions did not perform well with respect to their lending operations (Adams et al., 1984). In many cases the interest rates they charged were half or less than half the opportunity cost of funds for these financial institutions. Subsidized interest rates on loans provided by these institutions ended up restricting access to credit of the very people for who these loans had been introduced. This was because cheap credit created a gap between demand and supply, leading to credit rationing. Lenders in general had an incentive to lend to those who had suitable collateral. Moreover, they also had incentives to distribute large loans.[4] Wealthier borrowers are more likely to provide the necessary collateral and to apply for larger loans. Additionally, borrowers with some political influence had a higher chance of succeeding to get subsidized credit. Thus, the main beneficiaries of such schemes were the wealthy and/or those with some political power. Moreover, the provision of subsidized loans vividly hindered their ability to mobilize savings with attractive interest rates (Adams and Von Pischke, 1992).

In addition to their inability to reach the poor and to mobilize local savings, several of these institutions also lacked viability to survive. First, they were inefficient in their loan recovery practices. In many cases, borrowers considered loans provided by these institutions as gifts from

[4] Despite of their handling of subsidized loans these institutions are usually pressured into minimizing transaction costs and increasing repayment performance. The best way to increase repayment performance is to distribute large loans to those who have collateral.

governments and refrained from repayment. In other cases, they got exemptions from repayment as a form of political patronage from local politicians. Second, providing loans to the agricultural sector and being active in rural areas of developing countries was expensive for these institutions and could lead to operational losses. Finally, the real value of their loanable funds persistently declined as a consequence of high inflation and the low interest rates they charged (Braverman and Guasch, 1986). Only very few development banks succeeded in creating defense mechanisms against such tendencies and were really able to reach the poor.

Since the mid-1970s a considerable volume of critical literature on the credit policies of these institutions has been published. The central components of the criticism concern the low interest rates, the poor mobilization of rural savings, the low loan recovery rates, and the fact that loans are mainly forwarded to the less needy (Ellis, 1992; Adams et al., 1984).

The two views on development and the role of finance discussed above stress that “finance” means providing credit, that credit is all the poor (poor countries) need, and that apart from its function of channelling credit (capital) to users, the financial system does not do a lot for development.

The relationship between financial development and economic growth early on attracted the attention of economists. Smith (1776), Schumpeter (1911), Hicks (1969) and others provided illustrative stories of the ties between finance and development and the role financial systems play in economic growth and development. Schumpeter (1911), for instance, argued that bank intermediation through the evaluation and financing of innovative investment projects of entrepreneurs plays an important role in economic growth.

Important early contributions to the theory of financial development and economic growth were made by Gurley and Shaw (1960). They observed that during the process of economic development, countries generally

experience a more rapid growth in financial assets than in national wealth or income. Gurley and Shaw concluded that there is a relationship between financial development and economic growth. They emphasized the role of financial intermediation in the supply of credit for investment opportunities. Their observation was later confirmed by the seminal empirical work of Goldsmith (1969), who found that there is a positive relationship between financial development and economic growth.

Many economists have worked on this theme and Levine (1997), based on a comprehensive survey of literature, states that existing theoretical and empirical evidence on financial development and economic growth predominantly suggest the existence of a positive, first-order relationship between financial systems and economic growth.

Yet, the positive effects of the development of the financial system on economic growth may be reduced by various factors. McKinnon (1973) and Shaw (1973) show the negative consequence of undue interference by central banks of developing countries with the financial sector. They argue that governments interfere in the financial system of these countries by imposing ceilings on lending interest rates, demanding low-yielding reserve requirements, and creating an inflationary tax on monetary assets. McKinnon (1973) defines all government regulations and policies that hinder financial institutions from working to their potential as financial repression. He says that financial repression can reduce the effectiveness of financial institutions in efficiently allocating resources in an economy.[5] The extent of the negative effects of financial repression on an economy has been empirically confirmed by Fry (1995).

McKinnon (1973), and Shaw (1973) argue that governments should eliminate repressive financial and monetary policies and deregulate the financial system, so that the system can contribute to economic growth. Yet, several researchers have shown that these reforms have to be

[5] For instance, interest rate ceilings on both deposits and loans restrict institutions from mobilizing domestic savings and covering their transaction costs. Moreover, forcing institutions to keep higher rates of reserve requirements reduces their business opportunities and profitability.

accompanied by prudent banking regulation and supervision, and healthy macroeconomic policies if they are going to be effective (Andersen and Tarp, 2003; Demirguc-Kunt and Detragiache, 1998). Especially the effectiveness of financial liberalization in bringing economic growth may be harmed when we consider that financial markets do not operate like normal markets. Stiglitz (1989) argues that financial markets do not operate as perfect competitive market models demonstrate, since they are subject to information and incentive problems. According to Stiglitz (1989), a rise in interest rates can lead to adverse selection and moral hazard problems, which might intensify credit rationing. The next section further clarifies the difficulties financial markets face as a result of the problem of asymmetry of information.

2.5 The asymmetry of information and credit markets

The theory of asymmetric information comes from the discipline that is known as "economics of information". The basic teaching of this discipline is that in many markets such as labor, finance and insurance, information is asymmetrically distributed and is costly to acquire. These markets are not spot markets where buyers and sellers meet and decide on prices. On the contrary, in the credit market for instance there is a time period between forwarding a loan and the repayment. Whether the lender gets his money plus interest back depends on the repayment probability of the borrower. According to Stiglitz (1989) financial contracts include elements that lead to the basic problems of adverse selection and moral hazard.

This idea emerged in the 1960s, when economists started to claim that because of high information and enforcement costs, some markets will not exist and other markets will not even be approximately competitive. One of the pioneers in this area, who worked on the problem of adverse selection, was Akerlof (1970). Akerlof wrote an article on the theory of lemons and quality uncertainty. In his work he argues that in certain markets doing business is difficult because of the adverse selection problem. His basic model analyses a market in which sellers offer different qualities of products and are aware of these differences. Buyers,

however, are unable to distinguish between products and they therefore offer a price that reflects the perceived average quality of the products – treating all products as if the quality is the same. This may force sellers who offer high quality goods to withdraw their goods from the market. Hence the market for these high quality goods can fail to clear, although all agents are acting rationally. Akerlof's work was the first theoretical model on adverse selection.

A second problem, which also arises as a result of informational asymmetries, is moral hazard. Arrow (1963) was one of the first contributors to the theory of moral hazard. He focused on the influence contracts between parties have on the behavior of the relatively more informed party. This gives rise to the principal-agent literature, which analyses a situation where one party, known as the principal, enters into a contract with another party, known as the agent. In this situation, the principal may not be able to observe the agent's behavior (actions or decisions). The term moral hazard is applied because the actions taken by the agent are based on his own self-interest and not necessarily on the best interest of the principal. Therefore, the principal wants to devise a contract that will induce the agent to undertake actions that are not in conflict with his interest.[6]

The main objective of this section is to discuss the impact of asymmetry of information in credit markets. Credit institutions exchange money today for the promise of money in the future and write a credit contract that includes elements that will make it more likely that this promise is fulfilled. Lending activity entails (a) the exchange of consumption today for consumption in a later period; (b) information acquisition regarding the characteristics of loan applicants (screening problem); (c) measures to ensure that borrowers take those actions that make repayment most likely (incentive problem); and (d) enforcement actions to increase the likelihood of repayment by borrowers who are able to do so. In the

[6] In his work Arrow gave examples on medical care and insurance markets. For instance, an insured person will be less careful once he is insured, and any costs due to an accident are borne by the insurance company.

following paragraphs we will discuss in some detail the two main problems lending entails, namely adverse selection and moral hazard.

2.5.1 Adverse selection

The adverse selection problem takes place when borrowers have private information about their personal behavior and/or the project they want to invest in, before the credit relationship begins. While the lender may have a good idea about the average characteristics of the pool of potential borrowers, he may not have full information on the characteristics of each borrower and the riskiness of his project.

In order to see how the adverse selection problem arises in financial markets and how the interest rate can be used as a direct screening mechanism to differentiate the risky projects from the safe ones we assume that borrowers and lenders are risk-neutral. There are two groups of borrowers, safe and risky ones, who can choose between safe and risky projects. Both groups of borrowers have the same mean gross return but a different risk variance. Both groups of borrowers know the probability of a successful outcome and the value of output if successful, while the bank is assumed to be ignorant of the probability of success of individual borrower projects. Even though it is assumed that the bank is ignorant about the characteristics of each individual project, it does know the value of the common expected gross return of the two projects.

The model developed by Stiglitz and Weiss (1981) indicates that the lender does not use the interest rate as a sorting device because changes in the interest rate may affect the riskiness of the pool of borrowers. The model assumes that riskier borrowers have access to riskier projects with lower probability of success but a higher return if they succeed, while safe borrowers have projects with higher probability of success but a lower return. For any class of projects with the same mean gross return but differing risk, the interest rate can be used to determine the riskiness of a project. At a certain low interest rate even low return low risk projects will survive. As the interest rate increases, low return projects will start to yield negative expected returns. Thus, the higher the interest rate, the

higher the net expected return must be before a borrower finds it worth borrowing for this project. All remaining projects that give the borrower a higher expected net return entail a lower probability of success. Borrowers with low-return, low-risk projects will drop out of the credit market, because they are unable or unwilling to pay higher interest rates. Hence, the bank cannot use the interest rate as a signaling mechanism.

This analysis of credit markets is contrary to the classical teachings of the market mechanism. When there is an excess demand for loans at a given interest rate, classical economic analysis would suggest that the price (interest rate) would rise to choke off excess demand. But in the case of asymmetric information, the lender will choose to keep the interest rate low enough to obtain a favorable risk composition of projects and to ration the available loanable funds through other means. Thus, demand may exceed supply, while the interest rate does not rise as a result.

2.5.2 Moral hazard

Another type of information asymmetry problem is moral hazard. Moral hazard occurs in credit markets if raising the interest rate induces borrowers, who have a choice of projects, to invest in a project that yields the bank a lower return than another project in which the borrowers could have invested. Similar to the above case, here we also assume that both the lender and borrower are risk-neutral. We assume that a borrower has to invest in one of two projects (safe or risky) that are available to him, the riskier project has a lower probability of success but a higher payoff if it succeeds, while the safe project has a higher probability of success but with lower return. However, the bank does not know which project has been chosen.

Here, the interest rate acts not as selection mechanism, as in the previous case, but as an incentive mechanism, since it affects the actions taken by the borrower once he has obtained the loan. At lower interest rates, it is worthwhile for the borrower to invest in the safer project that brings positive returns. But as the interest rate continues to increase, the borrower is induced to switch from the safer project to the risky one,

because with the increased interest rate the safer project starts to yield negative net returns. To be more precise, the higher the interest rate, the higher the net expected return has to be, and only the risky project will fetch higher expected net returns, which induces the borrower to opt for it.

This switch affects the expected returns of the lender because of the limited liability characteristics of the loan contract. If the project is successful, the lender will receive at most the loan amount plus the interest accrued, while if the project fails, the lender will receive nothing (or any residual value). The expected returns to the bank are lower for the riskier project than for the safe project. Accordingly, due to the moral hazard problem banks tend to keep the interest rate low and instead ration credit in order to curb excess demand.

The various forms of financial markets try to tackle the asymmetry of information problem differently. The formal financial institutions tend to deal with the selection and incentive problem by imposing stringent collateral requirements or restrictive covenants, or by requiring borrowers to provide carefully documented evidence, showing their intention and ability to repay (Floro and Yotopoulos, 1991). Those who get credit from the formal financial institutions are usually firms and institutions that are active in the formal business sector; they have the necessary collateral, credit history, and/or use a reliable accounting system.

However, the credit needs of the majority of the rural and urban poor of developing countries remain unsatisfied by the supply of credit of formal financial institutions. These people are unable to provide collateral, they have no documented credit history from the formal financial sector, and they lack accounting records. At the same time, the informal financial market, for the reasons discussed in section 2.3, will also not be able satisfy the credit needs of the poor.

On the other hand, access to credit from the MFIs uses mechanisms that make credit arrangements possible without the use of the traditional methods employed by the formal financial institutions. By using mechanisms such as social networks, social ties and social sanctions MFIs

are in a position to reduce the selection, incentive and enforcement problems inherent to credit transactions, which may not be effectively handled in formal financial institutions.

2.6 Examples of microfinance institutions

The practice of microfinance is not new. Credit cooperatives and charities providing loans to young entrepreneurs have been documented from eighteenth-century Europe (Hollis and Sweetman, 1998). Notable examples are the German credit cooperatives in the late nineteenth century that were often located in rural areas. The last two decades have witnessed the emergence of financial innovations in reaching the low-income producers with affordable credit and suitable mechanisms. The origin of these innovations lies in Asia and Latin America, and this practice has reached other parts of the world as well. It is called microfinance, because it provides micro loans to those members of societies who do not have access to credit from the established financial institutions. Microfinance refers to small-scale financial services that are provided to people who farm fish or herd, operate microenterprises where goods are produced, provide small-scale services, or work for wages or commissions at local levels in developing countries, both rural and urban.

Although we observe different models of microfinance in different parts of the world, all systems have some characteristics in common. One of the main common characteristics, as the next subsection will to show, is the ability to curb problems that arise from adverse selection and moral hazard.

These days we witness a broad range of MFIs offering alternative forms of financial models with different aims and target groups. According Lapenu and Zeller's (2001) survey of 1,500 MFIs from 85 developing countries, MFIs reach 54 million members, 44 million savers, and 23 million borrowers with a total volume of outstanding credit of $ 18 billion. The total savings volume is $ 12 billion, or 72 per cent of the total volume of outstanding loans. MFIs have set up at least 46,000 branches and employ around 175,000 staff.

These institutions have attained high repayment performance and have reached large numbers of the poor members in developing countries. Table 2-1 shows the repayment performance and outreach of some of the institutions surveyed by Lapenu and Zeller (2001).

Repayment rates appear to be high at 91 per cent. After weighing the repayment rates by the loan volume, the result increases to 98 per cent, implying that MFIs with larger loan volumes seem to have a better repayment rate.

Lapenu and Zeller (2001) have used several proxy variables in order to measure access of the poor to financial services, such as the percentage of female clients, average loan size, and average deposit size. The unweighted percentage of female clients shows a higher outreach of MFIs to women (78 per cent). However, weighing this result by the size of the MFIs (size is determined by the number of members) the share of women falls to 45 per cent. On average, MFIs offer services of a very small size, suitable for poor people. The average loan size is less than $ 300, and average deposits are less than $ 100, representing 62 per cent and 18 per cent, respectively, of the annual GDP per capita.

In the following paragraphs we will present the different types of MFIs by roughly dividing them into two approaches, namely group-based and individual-based lending.

Table 2-1Average performances of MFIs in the developing world, 2000

	Average value
Repayment	
Repayment (unweighted, per cent) (N =347)[7]	91
Repayment (weighted by volume of credit) (N =347)	98
Outreach	
Percentage women (unweighted) (N = 487)	78
Percentage women (weighted by number of MFIs members) (N = 487)	45
Loan size ($) (N = 376)	268
Deposit size ($) (N = 272)	99
Loan as a percentage of per capita GDP (N =367)	62
Deposit as a percentage of per capita GDP (N = 269)	18

Source: Lapenu and Zeller, 2001

2.6.1 Group-based lending

Group-based lending, as the term already indicates, requires individuals to organize themselves into groups in order to gain access to financial services from a program. We witness different programs and projects to be involved in providing loans to these people. Sometimes, governments own and run these programs; in other cases international institutions, local and foreign NGOs are involved in reaching poor borrowers.

Normally, group-based lending works as follows. Loans are made to individuals, but all members of the group are held responsible for the loan repayment (joint liability principle). In some programs loans are given strictly for a certain period of time (usually a year), while in other programs the members are allowed to decide the loan terms themselves. Repayments are made on a weekly or monthly basis; this is done at group meetings or directly to the branche of the microfinance institution. Nowadays, worldwide many programs use group-based lending to forward loans to the poor. Below we will give some examples.

[7] N indicates the number of observations (number of MFIs).

a) *Grameen Bank.* The Grameen Bank, which was first established in Bangladesh, is the pioneer in group-based lending. At the Grameen Bank borrowers are grouped voluntarily into groups of five; they receive training on how the credit program works and start saving before they apply for a loan. Between six and eight of these groups come together to form a so-called village center. A group of village centers in turn forms regional branch office. According to the Grameen Bank model, new groups of borrowers meet and save for a minimum of four weeks before any loans are issued. The group appoints a group leader, and the members determine the rotation of access to credit. Two members of the group get the first loans. If they repay on time, the next two get their loan, and finally the fifth person, who is usually the group leader, gets the loan. All group members are responsible for the evaluation of member applications, monitoring, and enforcement of repayment. The Grameen Bank does not require collateral from its clients. If any group member defaults on a loan, the other four members must cover the loan. If they do not do this, none of the other members will receive a loan until the non-performing loan is repaid.

The amount of the first loans is generally small, usually less than $ 100, repaid at weekly meetings, and has to be fully repaid within a year. The bank follows stage credit programming and allows group members to be gradually promoted to higher loan amounts, provided they have a good repayment history. The clients are mainly women, and loans are usually used for micro manufacturing, services and retail trade.

b) *Latin American solidarity group lending*. This is a Latin American version of the Grameen Bank. The pioneer of this model of lending is the Banco Solidario (Bancosol) of urban Bolivia. Like the Grameen Bank, it lends to groups, but unlike Grameen it forwards loans to all group members at once. The solidarity groups can consist of four to ten members, who select each other. They cross-guarantee each other's loans, based on joint liability contracts. In order not to end up paying for their peers, members monitor each others' economic activities and enforce repayment if the need arises.

The bank issues uncollateralized loans, starting with small amounts of loans and frequent repayment. The repayment schedules are flexible, and borrowers are allowed to choose between weekly, fortnightly and monthly repayments. The duration is also flexible: from a one-month duration up to a year. Loan amounts and terms gradually increase once clients have demonstrated that they are capable of taking on larger loans (stage credit scheme). Access to future larger loans is made dependent on punctual and full repayment of small initial loans. Loans from Bancosol are usually made to provide working capital for small-scale activities, which includes retailing, services, and micro-entrepreneurship.

c) *Village banks (VBs).* This model of microfinance originated in Latin America in the 1980s and over the years it has been adopted in African and Asian countries. As the name indicates, it is a village-based and community-managed credit and savings association established to provide access to financial services in rural areas. Most of the time, donor-NGOs are active in setting up village financial institutions in partnership with local groups. VBs are initially financed through loans provided by a lending institution such as the Foundation for International Community Assistance (FINCA). Over time, member savings, share capital and accumulated interest rates are expected to increase so that external funding is no longer necessary. The aim is to make each VB an administratively and financially autonomous institution.

Normally, VBs consist of members ranging from 30 to 50 individuals and the members elect a management committee to run the bank. Individual members are required to save prior to requesting a loan and to continue saving during the loan cycle. Individual bank members negotiate their initial loan amount and terms with the committee of the bank. The initial amount is $ 50 at most and increases gradually, depending on the performance of the member. Loan cycles usually last from 16 to 36 weeks, with equal installments paid weekly, fortnightly, or monthly. Payments take place at regular meetings, where all members are witness to the transaction. The VB's committee enforces repayment by linking borrowers' access to future loans to their repayment performance.

Usually, VBs do not demand collateral; however, all members are jointly responsible for repayment. In order to mitigate the probability of repaying for defaulting members, the committee has to screen potential borrowers thoroughly. They may use the existing village social networks to obtain the necessary information. They use local information and social ties, not only for screening but also for monitoring and enforcing loan repayments. VBs also make use of members' savings to extend loans. This may enhance the perception among members that they have a stake in the institution, which may contribute to peer monitoring, enforcement, and good repayment performance.

d) *Credit cooperative/credit unions*. Credit cooperatives as financial institutions originated in Germany in the nineteenth century. Cooperatives are operated democratically with each member having one vote. The two organs of a cooperative are the general assembly and the management committee. The committee is assigned by the general assembly and has to promote and oversee that banking operations run smoothly. Moreover, it implements internal regulations and policies established by the general assembly. Equity is contributed by members, and leadership is voluntary and unpaid, although professionals can be hired for everyday administration and management tasks. The equity contributions provide the institution with its capital and can be the basis upon which the amount a member can borrow is determined. While credit cooperatives are typically initiated with capital contributions from their members, they may also mobilize deposits. Some credit cooperatives also depend on external funds.

Credit cooperatives rely on their management committees to analyze loan requests and to grant and recover loans. Credit committees make use of local knowledge and information in the process of accomplishing these tasks. Cooperatives provide relatively larger amounts and for longer periods of time, when compared to the microfinance approaches discussed above. Some credit cooperatives require collateral, others do not; instead they ask the borrower to bring another member as cosigner. If the borrower fails to repay, the cosigner is fully liable and has to repay on behalf of his colleague. Relying on self-financing enhances the perception

among members that they have a stake in the institution, which may thus contribute to peer monitoring and enforcement and good repayment performance (Huppi and Feder, 1990).

2.6.2 Individual-based lending

MFIs have also developed models that can provide financial services to individual borrowers. These institutions successfully combine mechanisms from the formal and informal lending sectors. They use different mechanisms, which help them reduce adverse selection and moral hazard problems, such as frequent and close contact with individual clients, to provide credit products tailor-made to specific needs.

Ledgerwood (1999) summarizes the mechanism used by the individual based lending micro-finance institutions as follows.

- Individual based lending institutions guarantee loans by demanding collateral, co-signing or using endorsement of village committees.
- These institutions screen potential borrowers using credit checks and character references.
- They provide small loans with flexible loan terms and loan sizes based on individual needs.
- They increase loan size progressively through time.
- They have intensive staff-client contact.
- Future access to credit is based on prompt and complete repayment of loans.

The two pioneering banks are the Bank Rakyat Indonesia (BRI) and the Bank Kredit Desa system of Indonesia (BKD).

a) *Bank Rakyat Indonesia*. BRI forwards loans to clients against some form of collateral[8] or with the help of a co-signer. The bank has a network of branches with a minimum number of employees (average of five employees per branch). Over time employees create personal relationships

with the clients, and credit officers are often recruited from the community so that they can base analyses on their knowledge of the client's creditworthiness (character-based lending). Detailed financial analysis and projections are often included in the loan application. The bank encourages its staff to maintain high collection rates and maximize profits by linking staff compensation to the volume of repayments collected and/or profitability.

b) *Bank Kredit Desa*. The other institution, BKD, also forwards loans to individuals. Yet, in contrast to BRI, individuals that acquire loans from BKD do not require collateral. Instead, BKD uses its own mechanism, which is to forward loans through village-level management commissions led by village heads. Indonesia has a well-defined administrative hierarchy running from the central government down to the village level, and BKD involves village level administration in the process of screening, monitoring, and the enforcement of loans. The loan applicant usually approaches a locally situated credit branch occupied by a local credit officer and applies for a loan. Depending on how well he knows the applicant the credit officer can provide direct credit to the applicant or he or she can consult the village commission for further approval. Hence, the applicant acquires a loan from the institution only if the officer in charge and/or local administration officials knows that the applicant is creditworthy. Thus, the bank uses local information when screening individual borrowers and enforcing repayments. Staff members have an incentive to do their job well because their compensation is based on loan repayment.

The financial approaches discussed above show the diversity of methods used in the provision of financial services to the poor in the developing world. These days we see a lot of modifications and adaptations being used to suit different societies and environments. Table 2-2 shows the distribution of activities worldwide by type of MFI in percentages of the total survey done by Lapenu and Zeller (2001).

[8] Collateral is loosely defined and may include tools, equipment used by the borrower, but can be also jewelry, expensive clothing, business license, etc.

The different MFIs have been classified into five major approaches based on the mechanism they use to provide loan services to their clients. As some institutions combine different approaches, e.g. individual and solidarity group models, they have been classified as mixed.

Table 2-2 Distribution of activities, by type of MFI in percentages, 2000

	Cooperatives	Solidarity groups	Village banks	Individual lending	Mixed approach	Tot.
No. of MFIs	11.9	16.4	11	58.3	2.4	100
No. of borrowers	9.9	67.8	2.1	17.9	2.3	100
No. of savers	31.2	25.9	0.6	41.7	0.6	100
No. of members	26.9	28	1.7	42.5	0.9	100
Volume of savings	60.5	28.9	0.1	10.4	0.1	100
Vol. of credit	59.8	34.8	0.2	4.5	0.7	100

Source: Lapenu and Zeller, 2001.

When the size of institutions is analyzed by type, the results can be summarized as follows: cooperatives are the largest institutions in terms of volume of savings and volume of credits. This may be due to their many years of involvement in the business, their emphasis on member savings as a means of financing, and their practice of issuing of relatively larger loans against collateral in comparison with the other institutions.

In terms of the number of MFIs, number of members and number of savers, individual lending has the highest figures in all three categories. This is possibly be explained by the fact that these institutions encourage savings and membership by opening many, very small, locally staffed institutions in rural areas of developing countries like Indonesia. Solidarity groups have the highest numbers of borrowers. This may be due to the fact that these institutions mainly borrow small amounts of money to large needy rural population of developing countries such as Bangladesh without much emphasis on voluntary savings. VBs are the smallest MFIs according to all aspects shown in Table 2-2.

2.7 Group-based lending: characteristics and limitations

Both approaches of microfinance programs have a wide acceptance in different parts of the developing world. However, the group-based lending programs have received the most academic attention. In the following paragraphs we discuss the characteristics and limitations of the group-based lending approach, not only because we want to follow the theoretical models and see whether or not their theoretical predictions also hold in practice, but also because the empirical analyses in this thesis are based on two group-based lending programs in Eritrea.

2.7.1 Group-based lending: positive contributions

Group-based lending contracts effectively make a borrower's neighbors' co-signers to loans, mitigating problems created by informational asymmetries such as adverse selection, moral hazard and enforcement. Thus, in group-lending programs the functions of screening, monitoring and enforcing repayments is to a large extent transferred from the bank agent to group members.

a) *Mitigation of adverse selection problems*. One of the advantages of group-based lending is the mitigation of adverse selection problem, which in turn reduces the problem of credit rationing and brings the safe borrowers back to the credit market. As will be discussed in chapter 8, in the process of group formation group members are expected to screen each other. Theoretical and empirical studies show that people try to investigate each others behavioral integrity and creditworthiness with the help of existing social networks before they allow others to join their group. Through peer screening they try to prevent irresponsible and credit risky individuals from joining their group.

b) *Mitigation of moral hazard problems*. Another advantage of group-based lending is the mitigation of the moral hazard problem. This is an incentive rather than a selection problem. As will be discussed in chapter 7, after members have received a loan they have to monitor each other to make sure that every member has invested the loan in a safe project,

which will guarantee repayment. Members make use of their social ties to acquire the necessary information and create social sanctions and pressure on non-performing members.

This is a costly activity for the members, as they have to spend time and energy monitoring each other. However, the creditor can now afford to lower the interest rate, which will offset to some extent the burden of these costs for the borrowers. Also, the microfinance institute is able to lower the interest rate as its monitoring costs have been shifted to members and the probability of repayment of its loans has increased.

c) *Mitigation of costly state verification*. The group-based lending contract also provides appropriate incentives to avoid the problem of costly state verification. This is sometimes called ex-post moral hazard. It occurs once actions or efforts have been undertaken and returns of the product activity have been realized. Yet, the lender cannot observe the yield from the project. The borrower might find it optimal to divert funds for repayment of the loan to other purposes and default. In group-based lending schemes group members live close to each other and they are well informed of each other's economic activities. Therefore, they face a lower cost of verifying each other's output as compared to a distant lender. Moreover, each member has the incentive to audit his partner.

d) *Peer pressure*. Peer pressure is a mechanism group members can use in the process of mitigating moral hazard and enforcing punctual repayment. In order to secure future access, members are obliged to monitor each other. Once output is realized and a member proves unwilling to repay, other members can use peer pressure and social sanctions to make him repay.

In most of cases, groups are formed from communities with many social connections and a lot of interdependence. Individual community members follow and respect shared social values and norms such as mutual assistance, managing communal properties, etc., and this social system constitutes a powerful device to reinforce repayment among group members. In such communities, if a borrower fails or refuses to repay his

share, other community members may turn to social penalties such as warning and hassling, telling the rest of the community that he refuses to repay or complaining to community chieftains (i.e. traditional legal action). This could damage the bad borrower's reputation and it might isolate him socially. Thus, the ability of groups to harness social sanctions and make use of such sanctions in inducing members to repay their shares can be an important mechanism to sustain groups and improve repayment performances of programs.

e) *Minimum transaction costs.* Providing loans to small individual borrowers who live in geographically dispersed areas and work in relatively risky economic environments leads to high loan transaction costs[9] for the lender. Distributing loans through groups of borrowers is assumed to result in lower transaction costs for both the lender and the individual borrowers. The lender's costs are minimized, as he is dealing with the group as whole, rather than with individuals within a group. At the same time, since the group is responsible for distributing loans and collecting repayments the costs to individual borrowers are also reduced.

Yet, there is an inverse correlation between the size of the group and group's transaction costs. On the one hand, the transaction costs are fixed costs and the larger the group, the lower the cost to individual members. On the other hand, group size cannot be increased beyond a certain level without negatively influencing group efficiency in monitoring, screening and enforcing. When the group is small, the time and effort spent by each member of the group on monitoring is manageable, but with the increase in size the monitoring effort may end up being demanding and the situation may lead to free riding by some members. Hence, there is tradeoff between the reduction of group transaction cost and effectiveness of peer monitoring, which has to be taken into account (Armendáriz De Aghion, 1999; Braverman and Guasch, 1993).

[9] Transaction costs include costs such as administrative costs (salary, utilities, depreciation, auditing, etc.) to the lender, and transportation, application, waiting, collecting, and repayment costs for the borrower.

With respect to costs, some authors state that group-based lending may not be more attractive from the point of view of the borrower than applying for a loan on an individual basis unless it leads to interest rate reduction (Krahnen and Schmidt, 1994; Madajewicz, 1999). Of course, this comparison is only relevant if a borrower has a real chance of getting an individual loan on terms that are comparable to those offered in the group-based lending arrangement (Krahnen and Schmidt, 1994).

2.7.2 Group-based lending: limitations

This section will discuss group-based lending limitations and shortcomings.[10]

a) *Domino effect*. In group-based lending programs the possibility of collusion of all members not to repay cannot be ruled out. The very assumption of joint liability might make the decision for or against loan repayment a strategic one that is taken by all borrowers. Apparently, a group member will not be prepared to repay his loan if he expects other members to default, because if this happens he will be denied access to additional credit or his share in making payments for others increases. This is also called the domino effect, which may take place when defaulting borrowers inflict negative externalities on good borrowers, inducing others not to repay whereas they might have repaid in case of individual lending.

Bratton (1986), recording the experience of borrowers from Zimbabwe, stated that during a good agricultural season farmers show higher repayment performance. However, when the harvest is not that good, potentially creditworthy borrowers might expect some members of their group to default. This may lead them to decide to default, which leads to a dramatic rise of the default rate. Paxton and Graham (2000) found that the domino effect was a strong and significant determinant of group loan repayment in her study of Burkina Faso's group-based lending program.

[10] Most of these limitations are not yet investigated empirically.

b) *Joint liability is not optimal*. In group-based lending the joint liability contract is seen as the main driving force for members to actively monitor and reinforce repayment. Yet, denying future loans as a punishment is a deadweight loss to a borrower, when this borrower has enough output to pay for himself but not for his defaulting members. Rai and Sjöström (2000) therefore argue that the joint liability mechanism is not optimal and has to be augmented by cross-reporting. Through cross-reporting the successful borrower may be induced to help to repay the loans of unsuccessful borrowers when he can minimize this loss.

By cross-reporting we mean that if group member i fails to repay, borrower j receives a harsh punishment only if borrower i reports that borrower j is withholding some output from the lender. This allows an unsuccessful borrower i to pressure j (the successful partner) to repay his/her loan if possible. But if the cross-reporting reveals that borrower j could not repay borrower i's portion, he/she will not be denied future access to a loan. Rai and Sjöström (2000) observed that in the weekly borrowers meetings of the Grameen Bank borrowers implicitly used cross-reporting in enforcing successful members to pay for the unsuccessful ones. Based on their observations they argue that the conditions under which joint liability is optimal are narrow and unlikely to hold in practice and they claim that joint liability will not be enough to efficiently induce borrowers to help each other.

c) *Limitations of social collateral*. As is mentioned before, one of the key problems that led to group-based lending is the poor lack any seizable physical assets that can be used as a collateral in enforcing repayment. Therefore, group-based lending programs rely on credit denial and social sanctions in enforcing repayment and these alternatives are often grouped together and termed social collateral. But it is difficult for the bank to lend effectively on social collateral, as the lender does not have a very good idea of what the value of social collateral actually is to the borrower. For instance, access to future credit is not a traded good, so it does not have a market value. The lender must try and appraise the value the borrower actually attaches to access to future credit. This value may be significant, but it may also be zero if the borrower knows he can raise funds from

other sources, if he does not expect to need credit in the future, if he believes that the loan service is short-lived, etc. Bond and Rai (2000) argue that group-lending institutions are forced to rely entirely on their own estimate of how much the borrower values access, and this asymmetry of information consequently entails an adverse selection problem.

Similar considerations apply to social collateral composed of social sanctions – the borrower may find it terrible if his neighbors stop talking to him, or he may not be bothered about such a prospect. It is then important to investigate whether it is possible for the lender to know the value of sanctions to borrowers. Yet, in practice it is only insiders who can impose such sanctions – not outsiders. Therefore, in order to enforce repayment, MFIs are forced to rely on other members to actually compel defaulting members, but this involves the risk of a possible collusion between defaulters, other group members, and sometimes between defaulters and credit officers. This, in turn, may undermine the chance for the institution to get their money back. Bond and Rai (2000) provide detailed examples of this form of collusion taking place in certain MFIs.

d) *Group size and free riding*. The extent to which group-based lending can minimize the asymmetry of information problem depends among other things on the optimal group size. Certain programs using VB models in Latin American and West African countries use larger group sizes to the detriment of their efficiency. In certain Burkina Faso programs Paxton (1996), and MkNelly and Kevane (2002) observed that large sized groups usually face free riding problems, where some group members hide behind the large group to dodge monitoring and other responsibilities. Therefore, the existence of large groups can lead to imperfect information and moral hazard and it can make group solidarity an impractical mechanism.

e) *Matching problems between demand and supply*. Another negative influence on repayment occurs when the credit terms and conditions are no longer appropriate for each member, creating an inherent “matching problem” as group-based lending is repeated over time (Paxton et al.,

2000). At the beginning of a lending program, borrowers may be able to find group members with the same demand for loans and a similar supply, but the probability of the same group desiring consecutive loans with similar loan amounts diminishes over time. Thus, harmonizing supply and demand for credit among group members becomes more and more challenging over time and may result in defaulting if one or more members are no longer satisfied. This matching problem may occur when different members have received different amounts of loans and those who wished to get smaller amount of loans may lose the incentive to cover for their defaulting co-members, especially when the defaulting members have obtained larger amounts of money. Therefore, in some lending programs the loan terms are restricted by what the group feels it can guarantee jointly, so clients with growing businesses as compared to their peers may find that the group contract impedes their activities (Madajewicz, 1999).

2.8 Conclusion

Governments and international donor institutions early on recognized the role of finance for economic growth and alleviation of poverty, but failed to choose the appropriate financial institutions to achieve the objective. It took policy makers and academics almost thirty years to discover the right track and find alternative institutions. It is only recently that financial innovations, i.e. MFIs, have started to emerge. Consequently, policy makers and donors have started to show a strong willingness to support the start-up of MFIs in developing countries.

The main reason why these MFIs are becoming the forerunner in reaching and providing the poor with credit is their ability to mitigate the problems associated with asymmetry of information, i.e. adverse selection, moral hazard and enforcement. Despite the difference between group and individual-based microfinance programs, their basic objective in reaching the poor is similar.

As the MFIs analyzed in this thesis are group-based programs, the next chapters concentrate on group-based lending. The group-based lending

mechanism has a lot to offer in comparison with other financial institutions that try to do business with the poor. Group-based lending programs mitigate the problems associated with adverse selection, moral hazard and enforcement by delegating the problems of screening, monitoring and enforcement of repayment to borrowers. They do so by persuading group members to enter into joint liability contracts, in which all group members will be denied future access to loans from the program if the group defaults. To avoid denial of future access to loans, members may use social sanctions.

In chapters 6-8 we will test whether or not some of the positive contributions of group-based lending mechanism mentioned in this chapter actually work.

Chapter 3 Eritrean Financial Institutions

3.1 Introduction

This chapter investigates the Eritrean financial intermediaries. The aim is to see whether these institutions have the necessary competence and facilities to perform the role of facilitating Eritrean economic growth.

Eritrea became independent from Ethiopia in the recent past (in 1993) and has inherited an obsolete monetary and financial system. Obviously, the time-span during which we investigate the impact of the financial system on Eritrean economy is short. Nevertheless, we feel that looking at the policy of these institutions and at how they are doing in promoting the credit needs of the Eritrean poor will help us understand the limitations of the sector.

Contemporary Eritrean formal financial sector can be characterized as small, state-owned, underdeveloped and providing rudimentary banking and other financial services to the economy. The majority of the Eritrean poor does not have any access to these institutions. This is because the Eritrean poor are unable to provide collateral, they have no documented credit history from the formal financial sector and they lack accounting records. Moreover, the Eritrean informal financial market cannot meet the credit needs of the poor because of the sectors inherent limitations.

It seemed that the government of Eritrea recognized the shortcomings of the Eritrean financial sector and therefore they launched microfinance programs early on, which provide financial services to the poor. It is behind this background that the microfinance institutions have started to become active in Eritrea.

This chapter is divided into three sections. Section 3.2 deals with the historical development of the banking system in Eritrea; section 3.3 provides a comparative overview of the Eritrean formal financial sector; and section 3.4 describes the Eritrean formal financial institutions. This

section also introduces the types of banks in Eritrea. Section 3.5 briefly describes the informal credit sector, and section 3.6 concludes.

3.2 Historical development of the banking system in Eritrea

The formal financial sector, especially the banking business in Eritrea, emerged with the rise of the Italian colonial rule. In 1920 some Italian private banks, such as Banco di Napoli, Banco Nazionale del Lavoro, Banco di Italia, and Banco di Roma, were operating in Eritrea. Unfortunately, the formal financial sector was not developed further during the British military administration and thereafter. In 1941, with the coming of the British military administration Banco Nazionale Del Lavoro and Banco di Italia were closed, and Barclay Bank opened a branch in Eritrea. Both this bank and the East African Shilling, the currency that was introduced by the British administration, survived until 1952.

With the emergence of the political federation of Eritrea with Ethiopia in 1952, the State Bank of Ethiopia opened branch offices in Eritrea. Until the end of 1962, the bank acted as a central bank and it played the supervisory role for the other financial institutions in Ethiopia and Eritrea; at the same time it was involved in commercial banking activities. From the beginning of 1963, a new banking law issued by Ethiopian authorities split the functions of the State Bank of Ethiopia into two separated entities. The new National Bank of Ethiopia played the role of central bank, and the Commercial Bank of Ethiopia dealt with commercial activities. Simultaneously, the 1963 banking law made it possible for other commercial banks to work in Ethiopia. The biggest of these was the Addis Abeba Bank, which opened branches in Eritrea. During the early 1950s and the late 1960s, there was an economic boost in Eritrea. A lot of small firms that produced consumer goods started to emerge and flourished. A stock market was established and banks facilitated share-dealing activities, both as dealers and as providers of funds for share purchases.

The Agricultural and Industrial Development Bank (AIDB) was set up in 1970, replacing two development banks, which were active in Ethiopia since the 1960s. AIDB provided short-, medium- and long-term loans to the agricultural and industrial sector. The bank also opened branches in Eritrea.

Thus, before the fall of the imperial government of Ethiopia in 1974, Eritrea had four branches of commercial banks, namely Banco di Roma, Banco di Napoli, Addis Abeba Bank, and Commercial Bank of Ethiopia. In addition to this, there were branches of the Central Bank of Ethiopia, AIDB, and several small mortgaging and insurance companies.

The fall of the imperial government led to a major change in Ethiopian economic policy. The new military government declared Ethiopia a socialist state. The nationalization of all large corporations was one of the instruments to establish this centralized control.[1] As far as ownership of financial institutions was concerned, there were hardly any important changes, since the existing private commercial banks[2] were relatively small. They were nationalized and merged into the Commercial Bank of Ethiopia. The new Ethiopian government merely shifted from owning *most* of the banking system to owning it *completely*.

The Housing and Saving Bank (HSB) was created in 1975 after a merger between two small mortgaging companies established in 1962.

Nationalization also took place in the insurance industry, leading to the amalgamation of the subsector into the Ethiopian Insurance Corporation. The AIDB continued without having changed much. The practice of banking did change fundamentally though. The state-owned public enterprises became the larger customers of the banks and the banks were instructed to lend to them in support of the government's development plans.

[1] The Derg (the then military government, 1974-1991) nationalized practically all economic activities and subsequently introduced a central planning system to run the economy.

[2] The nationalized banks were Banco di Roma, Banco di Napoli, Addis Abeba Bank, and AIDB, and all mortgage banks and insurance companies.

Summarizing, with the arrival of the military government banks were merged into four specialized nationwide banks: commercial (Commercial Bank of Ethiopia), mortgage (Housing and Saving Bank), insurance (Ethiopian Insurance corporation), and development banking (AIDB).

Until 1991, the formal financial sector in Eritrea consisted of branches of the consolidated state-owned financial institutions mentioned above. Independent Eritrea inherited a financial sector that was solely geared to serve a centrally planned economy, which is characterized by extensive interest rate controls, centralized decision making (in which the provincial branches had an implementation role only), and bureaucratic interference guided by socialist ideology. Banks' lending policies were especially guided by national objectives.

The financial institutions Eritrea inherited from the Ethiopian occupation were the Ethiopian National Bank, the Commercial Bank of Ethiopia, the Agricultural and Industrial Development Bank, the Housing and Saving Bank, and the Ethiopian Insurance Corporation. In the past ten years the government of Eritrea has tried to revitalize and restructure the formal financial sector in line with its liberal economic policy. This liberal economic policy was manifested in the 1994 macro-economic policy issued by the government (GOE, 1994). Among other things, the macro-economic policy aims at the establishment of an efficient, outward-looking, private sector-led market economy, with the government playing a proactive role to stimulate private economic activities.

At present, the financial sector of Eritrea has a central bank, Bank of Eritrea (BOE); and two commercial banks, i.e. the Commercial Bank of Eritrea (CBE) and the Housing and Commerce Bank of Eritrea (HCBE). Also, it has one development bank, the Eritrean Development and Investment Bank (EDIB), and one insurance company, the National Insurance Corporation of Eritrea (NICE). With the exception of HCBE the government owns all financial institutions. From 1998 the government issued licenses to firms to set up foreign exchange bureaus. The main function of these bureaus is to purchase and sell foreign currencies.

Although the BOE enacted a comprehensive Bank and Financial Institutions Act, which in principle permits the licensing of private financial institutions, including the establishment of foreign banks, up till now no other local or foreign private financial institution has been allowed to work in Eritrea (with the exception of the foreign exchange bureaus).

3.3 A comparative overview of the Eritrean formal financial institutions

As discussed in chapter 2, the existence of developed financial intermediaries may help economies to show sustained economic growth and development. In this subsection, we discuss the position of the Eritrean financial sector and its performance in relation to financial institutions of other developing and developed countries.

We use a measure to calculate the size of the financial intermediaries; this measure is equal to the liquid liabilities of the financial system (M2) divided by GDP. M2 consists of the amount of currency in circulation plus demand, time and saving deposits held by the public at the central bank and commercial banks. A higher ratio indicates that the country's financial sector is more developed, larger in size and that it provides more financial services to the economy (King and Levine, 1993).

Table 3-1 presents the M2 to GDP ratio of some developing and developed countries for the 1993-1998 period. The table shows that the ratio for Eritrea is very low, indicating that the country's financial sector is still at its infancy stage. This means that the financial sector is still small and that financial intermediation and provision of services is underdeveloped.

Similarly, we can also examine the level of financial development of a country by measuring the amount of credit allocated to the private sector and is equal to the ratio of loans to the private enterprises to total domestic loans issued. The allocation of financial resources to the private sector may be highly related to the provision of services of the financial

intermediaries. Financial institutions that simply forward financial resources to the public sector will not be able to play an intermediating role (King, and Levine, 1993, Levine 1997).

Table 3-1 M2 to GDP ratios of various countries, 1993-1998

		1993	1994	1995	1996	1997	1998
1	AUSTRALIA	0.57	0.60	0.60	0.64	0.64	0.67
2	USA	0.60	0.57	0.57	0.58	0.58	0.60
3.	KOREA	0.40	0.41	0.41	0.43	0.45	0.48
4.	ITALY	0.54	0.51	0.47	0.45	0.47	0.47
5.	SWEDEN	0.49	0.45	0.43	0.46	0.46	0.45
6.	CHILE	0.40	0.37	0.39	0.39	0.40	0.42
7.	BRAZIL	0.73	0.38	0.28	0.24	0.28	0.28
8.	TOGO	0.32	0.30	0.36	0.25	0.23	0.24
9.	SENEGAL	0.22	0.23	0.22	0.24	0.23	0.23
10.	ETHIOPIA	0.28	0.32	0.28	0.25	0.25	0.21
11.	TANZANIA	0.24	0.25	0.25	0.22	0.20	0.18
12.	GHANA	0.17	0.19	0.18	0.16	0.19	N/A
13.	NIGERIA	0.21	0.22	0.16	0.13	0.15	0.18
14.	MALAWI	0.22	0.26	0.19	0.16	0.14	0.17
15.	KENYA	0.17	0.16	0.15	0.15	0.14	0.13
16.	CAMEROON	0.17	0.18	0.15	0.12	0.13	0.13
17.	SUDAN	0.12	0.24	0.14	0.11	0.10	N/A
18.	ERITREA	0.02	0.01	0.01	0.01	0.01	0.01

Source: IMF (2000)

Table 3-2 presents the ratio of a number of developed and less developed countries. Countries that have developed financial intermediaries are expected to have a higher ratio. As expected, this ratio is low for Eritrea. The two Eritrean commercial banks forward a large part of their assets to the public sector (IMF, 2000) in the form of loans. Whether this is a sign of government sponsored financial repression or whether it means that the banks are concentrating their business on the public sector because of other reasons needs to be further investigated. Yet, as we will see later on the CBE is not forwarding its loans to the small business sector because of its conservative credit policies. Similarly, other neighboring countries, like the Sudan, Ethiopia and Tanzania, also show low ratios. This indicates that financial institutions in these countries are not playing the role as efficiently as they should be.

In conclusion, we can say that the Eritrean financial sector is small, underdeveloped and offers only a limited range of financial services to the public (IMF, 2000). The sector is dominated by three commercial banks.

Table 3-2 Ratio of loans to the private sector to total domestic loans of various countries, 1993-1998

		1993	1994	1995	1996	1997	1998
1.	KOREA	0.98	0.99	0.99	1.00	0.98	0.94
2.	SWITZERLAND	0.92	0.92	0.92	0.91	0.92	0.94
3.	AUSTRALIA	0.87	0.88	0.89	0.88	0.92	0.92
4.	SWEDEN	0.87	0.85	0.87	0.87	0.89	0.88
5.	USA	0.81	0.82	0.83	0.83	0.83	0.85
6.	ARGENTINA	0.70	0.76	0.71	0.71	0.72	0.73
7.	NIGERIA	0.31	0.32	0.42	0.68	0.64	0.71
8.	IVORY COAST	0.62	0.65	0.66	0.65	0.67	0.66
9.	KENYA	0.63	0.54	0.59	0.62	0.64	0.59
10.	BRAZIL	0.55	0.80	0.80	0.70	0.67	0.58
11.	INDIA	0.49	0.51	0.52	52.0	0.53	0.51
12.	MALAWI	0.38	0.43	0.47	0.46	0.46	0.48
13.	ETHIOPIA	0.12	0.16	0.26	0.38	0.44	0.44
14.	NIGER	0.83	0.73	0.51	0.48	0.32	0.44
15.	GHANA	0.23	0.29	0.27	0.33	0.32	0.38
16.	CHAD	0.34	0.30	0.39	0.33	0.32	0.36
17.	TANZANIA	0.33	0.35	0.29	0.20	0.28	0.35
18.	SUDAN	0.21	0.28	0.28	0.32	0.34	0.31
19.	ERITREA	0,39	0.41	0.14	0.29	0.29	0.27

Source: IMF (2000)

3.4 A description of the Eritrean formal financial sector

3.4.1 Bank of Eritrea

When Eritrea became independent, a new central bank, the BOE, was established to replace the former branch office of the Central Bank of Ethiopia. However, until 1997 Eritrea was in a de facto currency union with Ethiopia, which limited its scope for an independent monetary policy. Thus, monetary management by the bank was largely restricted to aspects of interest rate, reserve requirement regulation and banking supervision. In 1997 Eritrea introduced its own currency, the Nakfa, and the BOE became the central bank. The enactment of the BOE's proclamation (GOE, 1997) and financial institutions' proclamation (GOE,

1997) substantially transformed the role of the bank. Immediately after its enactment the bank took steps to improve its regulatory and supervisory capacity. To these ends, the bank imposed regulations on legal reserve requirements and prepared drafts of a number of regulations to establish a money market, including credit facilities and the issuance of treasury bills. Other specific tasks of this central bank include (GOE, 1997):

- to issue, manage and retire the legal tender currency of Eritrea;
- to implement measures designed to influence money supply and credit availability, interest rates and exchange rates;
- to manage and account for the foreign exchange reserves of Eritrea and to issue regulations in respect to foreign exchange;
- to license and supervise financial institutions in Eritrea;
- to act as lender of last resort for depository institutions in Eritrea.

Despite the introduction of the above proclamations and good intentions of the bank management, the bank is not fulfilling its supervisory, regulatory and monitoring role the way it should. A reason for this could be that the bank has been faced with a severe shortage of trained, skilled and experienced permanent staff (Seghid, 2001).

In order to achieve the objective of price stability the bank has a mandate[3] to use three monetary instruments, namely open market operations, the discount rate, and required reserves. The open market operation is not used in Eritrea, because both money and capital markets are non-existent. At the moment, the bank also does not have a discount program. Thus, required reserves are the only tool currently used by the bank. At present the bank demands that commercial banks set aside 20 per cent of their deposits as reserves.

3.4.2 The Commercial Bank of Eritrea

The Commercial Bank of Eritrea is the largest commercial bank in the country, chartered by the government to accomplish a wide range of

banking activities that include handling demand, saving and time deposit accounts, and forwarding credit. Moreover, it provides international trade transaction services. At present the bank has 15 branches in major towns throughout the country. The government appoints the board of directors.

Since 1991 the CBE demand deposit account has drastically increased.[4] In 1998 demand deposit account was 58 per cent of total deposits of the bank and the percentage of saving deposit account was 41.5 per cent, while the share of time deposit was only between 0.2 to 1.4 per cent.

The CBE is entrusted with a wide range of financial activities such as stimulating agricultural production; export promotion, rural development and encouraging and financing working capital requirements of the industrial sector. Interest rates on loans and deposits are fixed.[5] Different sectors are charged different interest rates. The current maximum interest rate on loans ranges from 8 to 12 per cent per annum. The current interest rate on saving deposits is 4 per cent, while it ranges from 4 to 6.5 per cent for time deposits.

The loans portfolio, on the other hand, mainly consists of short-term loans, which the bank considers as less risky. As table 3-A1 shows (see the appendix at the end of this chapter), the bank's loans are adapted towards domestic trade and services, and larger state-owned and private manufacturing firms, which are considered to be relatively low-risk customers.

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[3] Proclamation NO. 93/1997 allows the bank to make use of these monetary instruments.

[4] There could be many reasons for this phenomenon. After the independence a lot of people who were living in the Diaspora started to come back with their savings and began to deposit their money with the bank until they invested it in the economy. But the overall reason could be that people who had lost confidence in the Ethiopian government's socialist economic policy and preferred to keep their savings in actual currency might have started to deposit their capital in the CBE after the independence.

[5] The interest rate is fixed and determined by the Bank of Eritrea (Eritrean central bank). In the past ten years there was not much fluctuation in the interest rate offered by the bank.

Collateral requirements for loans by the CBE amount to 100 per cent, thereby limiting the ability of investors to capitalize on business opportunities. Agricultural loans by CBE were about 5 per cent of the total credit in 1993 (World Bank, 1994). The average loan forwarded to the agricultural sector for the last seven years amounts to only 7 per cent and it was available mainly to large commercial farmers.

The CBE does not usually lend to small entrepreneurs, to people in the informal sector and to small-scale farmers, since they are considered to be high-risk borrowers. Moreover, the high cost of borrowing and the difficulties of having appropriate collateral have inhibited these microentrepreneurs from applying for credit at this institution. Indeed, the low productivity and lack of collateral in these subsectors make them not a very appealing client for the CBE.

Although the bank still dominates the banking business in the country with more than 90 per cent of the countries deposits and 80 per cent claims on the private sector, it is not making any profit on its main business (Von Eije et al, 2003). The reason for this is that the bank is suffering from chronic excess liquidity (CBE, 1998). In 1998, only 29 per cent of its deposits was forwarded as loans and advances to costumers. Hence, the bank cannot raise enough income to pay depositors, and its return on assets (ROA) and return on equity (ROE) were only 0.6 and 21 per cent respectively (Haile, 1999). The income of the bank comes from other sources: mainly from foreign currency transactions and banking service charges (CBE, 1998).

3.4.3 Housing and Commerce Bank of Eritrea

The Housing and Commerce Bank of Eritrea is a relatively small bank. Its predecessor was the Housing and Saving Bank of Ethiopia. This was a mortgage bank that forwarded loans for construction purposes only. In 1994, the Housing Bank of Eritrea was established and it took over all the assets and liabilities from the Housing and Saving Bank of Ethiopia. By 1996 the Housing Bank of Eritrea decided to expand its services by transforming itself from a strictly mortgage bank into a fully fledged

commercial bank that included all areas of commercial and international banking. It then adopted its present name of Housing and Commerce Bank of Eritrea (HCBE) to reflect the change.

The main objectives and functions of the bank include accepting demand, saving and time deposits; providing long-term loans for construction or for acquiring residential housing, buildings, infrastructure, and community facilities; and providing short-term loans for maintenance, repairs of dwellings, buildings, infrastructures, and community facilities. In addition, as table 3-A2 indicates, the bank is also involved in providing short-term loans to other sectors of the economy. Notwithstanding its claim that it is a full-fledged bank, the bank is still mainly a mortgage bank. As the table indicates the lion's share of the bank's assets consists of loans for construction purposes; other sectors obtain insignificant amounts of money. Like the CBE, HCBE provides loans against collateral. As a result of this collateral-based loan procedure, the majority of poor people, who have no collateral at all, are likely to be excluded from getting loans from this bank.

Table 3-A3 compares the amount of demand saving and time deposits of the two commercial banks. As we observe, the CBE is the dominant bank in terms of deposits and loans in Eritrea.

3.4.4 Eritrean Development and Investment Bank

Before independence there was a branch bank of the Agricultural and Industrial Development Bank (AIDB) in Eritrea. This bank was established in 1970 by the Haile Selasie regime to meet the pressing credit needs of the agricultural and industrial sectors of Ethiopia. The bank was a typical development bank – similar to traditional state-sponsored development banks we used to see in other low-income countries in the late 1960s. It was providing short-, medium- and long-term loans to the agricultural and industrial sectors of Ethiopia (Harvey, 1996). Even though about 63 per cent of the loans distributed during the early 1970s was given to the agricultural sector, state-owned farms, large commercial farmers and some cooperatives were the major beneficiaries (Lele, 1975).

Similarly, in the industrial sector the beneficiaries were the larger private and public firms (Lele, 1975). Almost all beneficiaries of these loans were located in central Ethiopia; regions on periphery were ignored. At the end of the day, the bank was facing a lot of overdue loans from state farms and it was almost paralyzed due to liquidity problems.

After Eritrean independence, the bank was practically inoperative for nearly five years and it was not until 1996 that the government formally established the Eritrean Development and Investment Bank (EDIB) as a successor of AIDB. The main objective of EDIB is to promote and accelerate the country's economic development by providing development finance to viable development-oriented projects in the agricultural, industrial and other sectors of the economy. What makes this bank different from its predecessor is that it is supposed to be a self-supporting bank.[6] The proclamation for its establishment allows it to mobilize savings from national and international sources, either private or public. Thus, it needs no grants and government subsidies. Yet, until the middle of 2003 the bank was not mobilizing savings from the Eritrean households and firms. Table 3-A4 shows the bank's sectoral distribution of loans.

As the bank's directives indicate, it forwards loans only to specific sectors of the economy and does not issue loans for merchandising purposes. Loans are more or less equally disbursed between the agriculture, manufacturing, services and mining-construction sectors. Similar to the other state-owned banks in Eritrea, this bank is also collateral-based. It requires borrowers to present legally registered collateral assets for any type of loan they want to acquire. Even though it is still at its infancy stage, its objectives are oriented towards the credit needs of medium and larges industries and commercial farms rather than microentrepreneurs.

[6] The AIDB was sponsored and financed by the Ethiopian government and other donors.

3.4.5 The Eritrean formal financial sector: concluding remarks

At present, the Eritrean banking sector has strong impediments that have to be resolved in order to make this sector an important factor in stimulating Eritrea's economic development. After the independence of 1991 the Eritrean banking sector inherited an obsolete monetary and financial system from the Ethiopian marxist government. Between 1974 and 1991 the military government of Ethiopia nationalized the banking sector and converted it into an appendage of the state administration. In this system, bankers were transformed into civil servants and bureaucrats, devoid of any sense of customer service and fast and efficient performance (Tsegai, 1999). It is this type of archaic organizational structure and banking behavior the Eritrean banking system is trying to leave behind. Existing banking practices in Eritrea could be characterized as low-technology, semi-manual operations. The conversion from manual to computerized banking operations is at its infant stage, and this is posing the most serious impediment to progress in banking services in Eritrea. Since the sector is not adequately connected to global telecommunications services efforts to computerize it are less valuable (Tsegai, 1999). Thus, the renovation of existing national telecommunication system could positively influence the banking sector in terms of its international banking activities and relations. Still, a lot has to be done before Eritrea will have (realized) modern banking practices.

At present, Eritrea is facing an acute shortage of skilled and professionally trained bankers to meet the growing needs of the economy (Tsegai, 1999). Until recently, there was no Eritrean banking college or other training center to educate skilled bankers. Although nowadays there is one training center that is run by the Ministry of Education, this center still lacks the necessary staff and other important facilities to train competent bankers.

To conclude, the financial sector of Eritrea can be characterized as a system that is still at a lower level of financial intermediation, providing narrow range of both financial institutions and instruments. It is a challenge for the government and the Bank of Eritrea to promote the

expansion and diversification of the range of financial assets, and to improve the quality of banking services available in the country.

3.5 The informal financial sector in Eritrea

The Eritrean modern sector is small and restricted to urban centers only. As the majority of its population depends on subsistence agriculture, the lack of significant monetized economic activity has been its defining characteristic. The daily monetized economic activities mainly take place outside the realm of activities of the few financial institutions that are currently available (Tsegai, 1999).

The other financial alternative to the poor is the informal financial sector. Informal credit is widely used in African countries (Aryeetey, 1995). The informal financial sector encompasses all financial transactions that occur beyond the functional scope of various commercial banking and other formal financial institution regulations. People in neighboring countries such as Ethiopia, Kenya and the Sudan have been acquiring large amounts of loans from informal sources (Adugna and Heidhues, 2000; Alila, 1992; Kevane, 1993). Similarly, even though few systematic studies in informal financial markets have been carried out in Eritrea, preliminary evidence suggests that the poor in Eritrea also acquire their loans from informal financial sources (World Bank, 1994). According to this World Bank report there is an informal financial sector in Eritrea that engages in all kinds of credit and saving mechanisms. These informal sources of credit include relatives, friends, local moneylenders, retails and suppliers, and ROSCAs.

Although the role of informal financial markets in the provision of credit to the poor cannot be neglected, informal financial markets are subject to certain limitations. As discussed in chapter 2, informal financial markets are not always good vehicles for long-term investments and do not contribute to the integration of markets in an economy (Tang, 1995).

3.6 Conclusion

As discussed in section 2, theoretical and empirical works have confirmed that the development of the financial sector and economic growth are positively correlated. A country's economic growth and private sector development will depend on the financial sector for the mobilization of savings, capital accumulation, diversification of investment risks, and the monitoring of investment projects (Levine, 1997). To deliver these services satisfactorily, the sector itself must be well developed, competitive, and easily accessible to savers and investors throughout the country. In short, the sector must offer a variety of financial products and posses the required quality and mix of skills to ensure the most efficient ways of utilizing financial resources.

The financial sector of contemporary Eritrea can be characterized as small, state-owned, undeveloped and providing rudimentary banking and other financial services to the economy. Not only are there only five financial institutions in the country and each one of them is located only in Asmara and in a few other major towns. The majority of the poor in rural Eritrea do not have any access to these institutions at all. This is mainly because the poor do not have any collateral to offer and banks prefer handling larger loans to geographically concentrated areas.

It seems that the government of Eritrea has recognized the shortcomings of the Eritrean financial sector. Therefore, it early on initiated pilot projects that provide microfinance to the poor. It is against this background that the MFIs have started to work in Eritrea. The next chapter deals with these two Eritrean MFIs.

APPENDIX: Distribution of loans by Eritrean banks

Table 3-A1 Sectoral distribution of CBE loans, 1996-2002 in millions of Nakfas[#]

Sector	1996	1997	1998	1999	2000	2001	2002	Average
Agriculture	102.73	119.65	137.27	170.82	143.84	157.49	225.16	151.00
	(7.11)	(8.10)	(8.20)	(9.35)	(9.90)	(9.61)	(11.71)	(7.57)
Manufacturing	202.13	332.16	358.22	324.88	289.67	363.67	410.37	325.87
	(14.00)	(22.52)	(21.40)	(17.78)	(19.92)	(22.20)	(21.34)	(16.34)
Domestic trade & services*	719.18	589.21	782.93	984.36	686.80	880.48	986.92	804.27
	(49.79)	(39.95)	(46.75)	(53.88)	(47.24)	(53.72)	(51.32)	(40.32)
Export & import	220.23	244.27	275.94	228.90	246.79	169.57	231.33	231.00
	(15.25)	(16.55)	(16.44)	(12.53)	(16.97)	(10.35)	(12.03)	(11.58)
Building & construction	89.54	104.47	43.97	61.83	46.85	39.19	34.80	420.65
	(6.20)	(7.08)	(2.63)	(3.38)	(3.22)	(2.40)	(1.80)	(21.10)
Personal loans	110.24	85.49	76.74	56.26	39.95	28.23	34.40	61.61
	(7.65)	(5.80)	(4.58)	(3.08)	(2.75)	(1.72)	(1.80)	(3.09)
Total loans	1444.05	1475.05	1675.07	1827.05	1453.9	1638.63	1922.98	1994.4

Source: CBE records on loans and deposits (2003)
Note: number in brackets shows percentage share of a sector
Until to December 1997, in millions of Birr (the official Ethiopian currency)
* Including wholesale and retail trade, hotels and restaurants and transportation and communication

Table 3-A2 Sectoral distributions of HCBE loans, 2001-2002, in millions of Nakfas

	Agriculture	Manufacturing	Domestic trade & services	Export & import	Building & construction	Mortgages	Total loans
2001	0.66	2.90	16.26	9.02	14.79	683.36	726.99
	(0.09)	(0.40)	(2.24)	(1.24)	(2.03))	(94.0)	
2002	0.19	2.99	36.52	14.46	21.70	712.95	788.81
	(0.02)	(0.38)	(4.63)	(1.83)	(2.76)	(90.38)	
Average	0.43	2.95	26.39	11.74	18.25	698.16	757.92
	(0.06)	(0.39)	(3.48)	(1.45)	(2.50)	(92.12)	

Source: HCBE' brochure (2002)
Note: numbers in brackets indicate percentages

Table 3-A3 Depositaccounts of both CBE and HCBE, 1994-1999 in millions of Nakfas

Deposits	1994		1995		1996		1997		1998		1999	
	CBE	HCB	CBE	HCB	CBE	HCB	CBE	HCB	CBE	HCB	CBE	HCB
Demand deposits	1258.4	0.0	1295.8	0.0	1670.9	6.0	1597.9	17.6	1808.7	71.8	2276.6	130.5
	(100)		(100)		(99.6)	(0.4)	(98.9)	(1.1)	(96)	(4)	(94.5)	(5.5)
Saving deposits	1317.9	30.4	1668.3	186.2	1827.4	325.1	2121.1	495.1	2529.4	695.7	2870.8	872.2
	(97.7)	(2.3)	(89.9)	(10.1)	(84.9)	(15.1)	(81.1)	(18.9)	(78.4)	(21.6)	(76.7)	(23.3)
Fixed deposits	318.2	0.0	449.2	31.3	261.3	67.6	186.0	61.5	130.9	31.9	160.5	87.9
	(100)		(93.5)	(7.5)	(79.4)	(20.6)	(75.0)	(25.0)	(80.4)	(19.6)	(64.6)	(35.4)
Foreign deposits	0.0	0.0	0.0	0.0	0.0	0.0	146.7	42.6	141.9	76.3	132.0	97.9
							(77.5)	(22.5)	(65)	(35)	(57.4)	(42.6)
Claims on	328.9	18.5	651	37.8	951.9	85.7	1218.8	261.8	1722.1	351.1	1753.0	417.9
Private sector	94.7	(5.3)	(94.5)	(5.5)	(92)	(8.0)	(82.3)	(17.7)	(83.1)	(16.9)	(80.8)	(19.2)

Source: IMF staff country reports No. 00/55, April 2000
Note: numbers in brackets indicate percentages

Table 3-A4 Sectoral Distribution of EDIB Loans, 2001-2002 in millions of Nakfas

	Agriculture	Manufacturing	Services	Mining & construction	Total
2001	10.03	6.24	6.71	7.96	30.94
	(32.41)	(20.17)	(21.70)	(25.72)	(100)
2002	5.80	13.65	4.04	5.82	29.31
	(20.00)	(46.56)	(13.59)	(19.85)	(100)
Average	7.92	9.96	5.38	6.89	30.15
	(26.27)	(33.04)	(17.84)	(22.85)	

Source: EDIB' brochure (2003)
Note: numbers in brackets show percentage

Chapter 4 Eritrean Microfinance Institutions

4.1 Introduction

This chapter deals with the two microfinance programs that are active in Eritrea. These programs are the Southern Zone Saving and Credit Scheme (SZSCS) and the Saving and Micro Credit Program (SMCP). Both programs make use of group-based lending with joint liability and both follow similar basic procedures.

Chapter 4 has two main sections. Section 4.2 deals with the description of SMCP: we will illustrate the background, the objectives and strategies, credit and savings methodology, and the organizational structure of the program. Section 4.3 describes the SZSCS in a similar way. The final section presents the conclusion.

4.2. The Saving and Micro Credit Program[1]

4.2.1 Background

The SMCP started to become active in 1996 as part of the Eritrean community development fund (ECDF). The source of funds for SMCP is the government of Eritrea, the World Bank (IDA), loans and grants from donors, and operating income. Since 2002 SMCP has been separated from the ECDF to become an autonomous unit operating under the Ministry of Local Government.

The main aim of the SMCP is to provide financial services to the vulnerable groups in both rural and urban areas of the country who have no access to formal banking services. The SMCP has been taking two different approaches with regard to the promotion of microenterprises. First of all, borrowing groups known as Solidarity Groups (SGs) organized in Village Banks (VBs) form the backbone of the program. This

[1] This section is based on Afeworki, (2000) and SMCP (2002 and 2003).

category of borrowers belongs to tier I. Generally, the beneficiary individuals that fall into this category will obtain short-term microloans that do not exceed 10,000 Nafkas per loan. Over 90 per cent of the SMCP clients fall into this category; these borrowers have to organize themselves into groups of three to seven members in order to acquire any loans from the program. On the other hand, individuals who graduated from group-based lending and individual entrepreneurs whose credit requirements cannot be met through the tier I facility may have access to a tier II window. This window should enable individual clients without recourse to collateral to borrow up to 100,000 Nafkas. In this thesis we are interested in the tier I part of SMCP, which uses group-based lending.

4.2.2 Objectives and strategies of SMCP

The goal of the SMCP is to promote the private sector in Eritrea by encouraging the development and expansion of micro and small enterprises, to assist individuals and groups to increase their income generating ability, and to improve their earnings and the overall prosperity of their communities.

The program has three operational strategies to achieve its objectives. The first strategy is to provide access to saving and credit to individuals who are currently unable to get access to credit from formal banks. The second strategy is to strengthen community representative structures, from village to higher levels, and to involve communities in the development and sustainability of the program. Finally, it tries to establish a legal, regulatory and judicial framework for the microfinance sector of Eritrea so that the SMCP can become an autonomous financial institution that is organizationally and financially sustainable.

4.2.3 Credit policy and methodology of SMCP

The SMCP is based on the creation of autonomously functioning VBs, which typically serve 35 to 105 members each. The VB is administrated at the village level through a saving and credit unit consisting of three members. The village (*Kebabi*) administrator acts as a chairperson while

the other two are solidarity group members. They are responsible for accounts and record keeping. These VBs create their own by-laws, manage their loan funds, and decide on loan requests. Thus, the SMCP delegates the responsibility of running VBs to these elected members.

Any citizen or group of people (irrespective of gender) that has limited or no access to credit from a formal financial institution may benefit from the SMCP credit, provided they agree to comply with the required terms of credit. While the SMCP's objective is to focus on the poor, there is no accurate data available on poverty levels in Eritrea, which makes it difficult to determine whether the poor are actually reached. The SMCP, together with the regional administration and other community leaders, analyzes the economic viability of an area in which it wants to set up a VB.

A potential borrower does not have to present co-signers or any physical asset as collateral. However, there are two conditions that serve as a form of collateral. The first condition is that solidarity group members will become eligible for loans only after having successfully accumulated mandatory savings equal to 10 per cent of the amount they want to borrow within a period of three months. The second condition is that the group is jointly liable for repayment of all loans made to group members, and no new loans are provided until all outstanding loans have been paid back. If a group fails to repay loans, it may be banned from all further programs.

a) Group formation and training

Once a village or town is identified by the SMCP as a potential area for credit promotion, the first step is to call a meeting with the village (town) community and explain how the program works. The moment the community agrees to the terms and conditions, a village credit committee is elected. The committee will be trained in the VB training center. The training usually starts with a discussion of the experiences with loan programs in other villages. In general, training events will cover subjects such as bookkeeping and recording, loan approval procedures; loan recovery and preparing/writing simple business plans. After the training

of the VB officials, the other members who have organized themselves into solidarity groups will be trained. Although the credit promoter (an employee of the SMCP) takes the leading role in training these solidarity groups, the committee is expected to train the solidarity groups on how the scheme works.

Beneficiaries will be eligible for SMCP credit if they are members of a SG. Here are some of the requirements for SGs to fulfil.

- The SG has to be formed through a process of self-selection by individuals who agree to the joint liability principles of the program and who trust each other.
- There cannot be more than one member from the same nuclear family (husband, wife and children) in a SG. However, members of the same family can join different SGs.
- SG members will have to accumulate savings in order to be eligible for borrowing. The willingness to save demonstrates a group's solidarity and its commitment to the program.
- SG members must be prepared to pay the registration and loan fees that are required by the leadership of the VB.
- In case different loan cycles and loan sizes occur within one SG, all SG members must agree on the terms and be ready to cosign for each other.
- Loans forwarded to SG members must be used for additional working capital or new investment and not for consumption.

b) Loan processing and approval

Individual members must submit their loan application including their business plan to their SG for screening and approval at an early stage. A loan request will be endorsed if the entire SG agrees. The group leader of the SG will then hand over the approved application to the VB for approval. The VB will examine the application and make a final decision. However, the VB has the mandate to reject the credit application formally, informing the SG on the cause for the rejection. Finally, after confirming that the loan processing procedures is in order, the regional SMCP's credit

officer will promptly pay out the required funds to the VB. In the past, the procedure and the paper work associated with the loan issuance, approval and disbursement was elaborate (especially in case of repeat loans). Although this system offered control over the flow of funds, it increased bureaucratic procedures and raised the transaction costs to the borrower and the program.

The program has seven loan cycles, and the loan size increases gradually. The first loan cycle starts at 1,000 Nafkas while the maximum is 10,000 Nafkas. In some cases, however, a fresh borrower may be allowed to start at a higher cycle if the committee can justify the amount. A good example of this is when the new borrower wants to buy an ox, for which he requires 3,000 to 4,000 Nakfas. At the same time, borrowers are allowed to repeat the same loan cycle.

Borrowers and the credit officer get together and select the maturity period and install payments for the loan. Receiving subsequent loans depends on the repayment of the previous loan. Unless all SG members repay, individual members are not eligible for a next loan cycle. Thus, graduation to the next cycle always entails repayment of previous loan commitments by all SG members.

c) Savings and interest rates

The SMCP uses compulsory, locked-in savings of group accounts. The amount of compulsory savings from SGs has grown in recent years. The SMCP and the VBs are not legally authorized to use savings for credit purposes. At present, all savings mobilized by the SMCP are deposited in the CBE in the name of the VBs.

The SMCP charges 16 per cent annual interest rate for tier I clients, which is higher than what the commercial banks in Eritrea charge. The interest rate is based on the following assumptions: a) the cost of funds is 8 per cent; b) the cost of administration of the loan portfolio is 6 per cent; and c) the loan loss provision is 2 per cent. The declining balance method is applied when calculating the interest rate, which means that the interest

rate is calculated after reducing part of the principal that is already repaid.[2]

4.2.4 Organizational structure and performance

Eritrea is divided into six administrative zones called *Zobas*, 59 subzones, and 2,606 villages clusters, organized into 701 legally registered administration villages (*Kebabis*). In 2002, SMCP covered all administrative zones (although in one zone the scheme is still quite new) and 49 subzones. In 2002 the program operated in approximately 158 administrative villages, consisting of 519 villages. This is an increase of 2.5 per cent compared to previous year. In the same year the program was organized into 162 VBs, serving 12,416 active clients. This number was 24 per cent higher than in 2001. Total disbursement of funds by the end of the year 2002 was approximately 23 million Nafkas, a 31 per cent increase from 2001. Table 4-1 shows a summary of the data for SMCP.

The degree of sustainability can be assessed by using the operational self-sufficiency index (OSSI) or the financial self-sufficiency index (FSSI). The assessment of the SMCP's organizational and financial past performance (July 1996-December 2001) is done by a simple trend analysis.

The operational self-sufficiency index shows the extent to which operating income covers operating expenses and provision of loan losses. As we can see from table 4-1, for the 1998-2002 period the program was able to cover its operating expenses from its income. The cost per unit of currency lent (CPUCL) indicator shows how much it costs to lend one unit of a country's currency. It is calculated by dividing all operational or financial expenditures by the loan amount disbursed: the lower the ratio, the higher the efficiency. For instance, in the year 1998 it cost 3 Nakfa cents to disburse a loan of 1 Nakfa currency. In the case of SMCP, the

[2] For instance an individual receives a loan of 100 Nakfas against an annual interest rate of 16 per cent. In the first month he pays 10 Nakfas. The remaining principal in the second month is (100 minus 8.67) 91.33 Nakfas.

trend of CPUCL shows ups and downs, and it is not easy to see a clear trend.

Table 4-1 Performance of SMCP, 1998-2002

	1998	1999	2000	2001	2002
VBs	76	85	88	146	162
Members	6,010	6,339	6,204	10,763	13,891
No. of loans	5,477	5,779	5,942	10,304	11,492
Loan amount*	8,902,520	9,184,808	9,259,711	17,617,584	23,037,580
Savings	1,199,498	1,466,860	1,669,487	2,709,593	3,873,599
Repayment	2,209,336	na	na	11,253,827	24,230,836
Delinquency rate[#]	20.4	7.12	5.96	2.71	2.56
OSSI	136.43	137.41	140.53	150.86	na
CPUCL[$] (operational)	0.03	0.08	0.12	0.05	na

Source: SMCP (2002 and 2003)
Notes:
* Amount of loans, savings and repayments are all in Nakfas
# Delinquency rate: amount of payments more than 30 days overdue/total outstanding balance of loan portfolio
[$] Operational expenditure includes expenses for salaries, running costs, loss funds due to defaults, and payments of interest for savings
n.a. is not available

4.3 Southern Zone Saving and Credit Scheme[3]

4.3.1 Background

The Southern Zone, which is one of the six administrative regions of Eritrea, consists of up to 1,000 villages inhabited by about half a million people. When the Ethiopians withdrew in May 1991, the government discovered 1.7 million Nakfas (US$ 243,000) in a bank account, which belonged to 67 villages and cooperative shops in the highland province of

[3] This section is based on ACORD (1996, 2000, and 2003).

Seraye. The government sought ways to pay this money to the inhabitants of the region. In 1992, the governor of the then Seraye province contacted a UK-based NGO, the Agency for Cooperation and Research in Development (ACORD) office, and requested its assistance to the develop credit scheme to utilize the available funds. ACORD has considerable experience with income generating activities in the region, especially in the Sudan. This led to a four-year credit and savings scheme, which started in 1994 with a one-year pilot. In addition to the relatively modest sum that was initially invested in the scheme, ACORD contributed a total of £ 860,000. This consisted of £ 286,000 in 1994, £ 230,000 in 1995, £ 188,000 in 1996, and £ 155,000 in 1997.

4.3.2 Objectives and strategies of the SZSCS

The objective of the scheme is to improve the living conditions of the poor in the southern region. The program has three operational objectives. Most importantly, it wants to give people who do not have any dealings with the formal financial sector, access to credit. Secondly, it wants to strengthen community representative structures and build institutional and human capacity so that in the future members can run their VB by themselves. Finally, it aims to establish a legal base, which is organizationally and financially sustainable.

The scheme is aimed at the needs of the poor, especially women; it makes use of group solidarity and relatively low loan ceilings and regular savings requirements. The approach is participatory, and its clientele is a mixture of groups of which the majority consists of poor people. Hijacking of the benefits of the program by middle class members or by men is prevented through the social control of the elected village committees.

4.3.3 Credit policies and methodology of the SZSCS

The foundation of the scheme is an assembly of SGs called Credit and Saving Groups (CSGs). These CSGs elect five persons (at least two women) as members of a village or town Credit and Saving Committee (CSC). This committee is a representative of the CSGs. At the next level we find the Sub-Provincial Credit and Savings Councils (SPCSs), which are formed by elected representatives from CSCs. SPCSs are responsible for the development and amendment of policies and also for training and research, but they are not directly involved in the credit screening of members.

a) Group formation and training

The moment a priority area, a village or group of villages (*Kebabi*), or potential members in a provincial town are identified, credit promoters from the scheme call a meeting with the village community and explain how the scheme works and how the community may benefit from the scheme. Once a group of people, ranging from 35 to 100 persons, has shown an interest in the scheme, it will receive further training and is encouraged to start saving to show that their intentions are sincere. The SZSCS follows the group-based lending principles, and potential borrowers are trained to organize themselves into groups ranging from three to seven, called SGs. Every SG is represented by its group leader, who will have regular contact with the CSC. A credit promoter will represent the scheme.

b) Loan processing and approval

Loan requests by individual members are discussed within the SG. A loan request will be endorsed if the group as a whole agrees. Groups may accept or reject a proposal because a group guarantee is involved. Loan requests that are agreed upon go to the CSC for screening. The committee meets once a month and screens loan applications immediately. Loan applications endorsed by the CSC are forwarded to the headquarters for approval, at which point the loan becomes effective and the approved

amount is disbursed to the member. Loans range from 1,000 to 8,000 Nafkas. In the past the loan size enabled the scheme to adopt a progressive system, which helped poor clients to expand their investment gradually. Nowadays, rigidity concerning the loan size and maturity period is almost totally eliminated. Borrowing members who want to start at a higher loan scale are allowed to do so, provided that the project requires more funds than the initial amount of the loan and that the other group members agree. Repeated loans are only granted if the previous loan has been successfully repaid. This shows the strict adherence of the program to the joint liability principle. Borrowers can choose the loan and instalment terms after discussing this with their credit promoter. Table 4-2 shows the amount of loans in each loan cycle and the possible maturity periods of both programs.

Table 4-2 Maximum loan sizes in the different loan cycles in Nakfas

	SZSCS		SMCP	
	Loan size	Maturity	Loan size	Maturity
1.	1,000	3-24 months	1,000	3-24 months
2	2,000	3-24 months	2,000	3-24 months
3	3,000	3-24 months	3,000	3-24 months
4	4,500	3-24 months	5,000	3-24 months
5	6,000	3-24 months	7,000	3-24 months
6	7,000	3-24 months	8,500	3-24 months
7.	8,000	3-24 months	10,000	3-24 months

Source: SMCP (2002) and ACORD (2000)

c) Savings and interest rate

The savings policy introduced by the scheme is obligatory in two ways: (i) first, a group will not be recognized before it can produce a regular savings of 5 Nakfas per month; (ii) savings are linked with loans as a collateral, in addition to the guarantee offered by the group members.

Initially, the requirement was 25 per cent of the requested loan amount, but this was reduced to 15 per cent in order to accommodate poorer groups. Recently, the requirement has been further lowered to 5 per cent for female clients and to some extremely poor communities, but it increases with the amount of the loans. The scheme pays 7 per cent interest for individual savings and group savings deposited in commercial banks. The program is not allowed to use the savings for its loan business. During the early days the SZSCS used to charge an annual interest rate of 12 per cent per annum, which was raised to 14 per cent per annum in 1997. Since the start of the scheme, it obtained a subsidy from ACORD in the form of grants and technical assistance.

4.3.4 Organizational structure and financial performance

Originally, the program served only borrowers from the then Seraye province.[4] Today, it is active in the whole of the Southern Zone and in certain parts of other zones. As mentioned above, the SZSCS partially acquires its financial support from ACORD. Reliance on these funds raises questions whether this scheme can sustain in the near future without outside support.

The number of clients increased from 8,102 in 2001 to 9,157 by the end of 2002. The total loan disbursement by the end of that year was approximately 17.5 million Nafkas, a 30 per cent increase compared to 2001. At present, the scheme operates in 163 administrative villages, encompassing 527 villages – a 20 per cent increase compared to 2001. The number of VBs has increased from 8 in 2001 to 18 by the end of 2002. Table 4-3 shows summary data of the SZSCS.

[4] The Southern Zone is the most populated zone of Eritrea; the former Seraye province is part of the Southern Zone.

Table 4-3 Performance of SZSCS (1998-2002)

	1998	1999	2000	2001	2002
Villages/towns	110	199	242	429	527
VBs	3	5	5	8	18
Groups	979	1,430	1,556	2,147	2,493
Members	4,602	5,908	6,185	8,102	9,157
No. of loans	1,517	2,473	1,627	4,166	4,569
Loan amount*	3,143,150	4,132,900	3,995,904	13,375,900	17,372,984
Repayment	3,424,609	3,137,416	3,574,530	Na	12,846,874
Savings	423,747	424,038	359,856	2,547,632	3,700,104

Source: ACORD (2000, 2003)
Note:
*Loan amounts, savings and repayments are all in Nakfas

In the year 2000 the program covered 72 per cent of its costs with generated income. Table 4-4 shows that the program is making important progress towards achieving financial sustainability since 1994. The CPUCL indicator shows a slight rise in the last three years. Yet, one cannot really conclude that the SZSCS has improved its efficiency.

Table 4-4 Financial performance of SZSCS, 1994-2000

	1994	1995	1996	1997	1998	1999	2000
OSSI (in %)	22	16	33	64	89	72	72
CPUCL (operational)	0.54	0.19	0.13	0.13	0.19	0.21	0.22

Source: ACORD (1996 and 2000)

4.4 Conclusion

The two Eritrean lending programs started their activities in the mid-1990s. The programs have similar objectives: providing credit to the poor, who do not have access to formal financial institutions. Both programs use group-based lending in trying to reach the poor.

This description of these two lending programs in this chapter has made clear that their activities and lending policies differ from other Eritrean formal financial institutions, which were described in the previous chapter. While the Eritrean formal financial institutions are collateral-based and urban-oriented institutions, the two Eritrean microfinance programs are grassroots-oriented. In particular, they are group-based lending programs that substitute collateral with joint liability principles.

Chapter 5 Statistical Data Description

5.1 Introduction

As mentioned in chapter 1, it is the aim of this thesis to study group formation, group monitoring and repayment performance of the clients of the two group-based lending programs in Eritrea. The existing literature on microfinance indicates that studying these issues requires the availability of several variables at group and group members level.

In the year 2001 we conducted a survey in four administrative zones of Eritrea. In this survey 351 individuals belonging to 102 groups were interviewed. The survey was conducted in provincial towns and villages in these four administrative zones. The survey areas were selected randomly. No survey was taken in the Northern and Southern Red Sea administration zones as the lending scheme in these two zones was in its initiation phase.

The survey helped us to construct a data set at the group and group members level, including all variables that are important to investigate the research issues in this thesis. Three basic research questions are mentioned in chapter 1: whether repayment performance of groups is positively influenced by screening, monitoring and enforcement activities of group members; whether peer monitoring and social ties help to reduce moral hazard among group members; and whether group members match homogeneously or heterogeneously in risk. In order to test these questions variables are required that measure screening, social ties, monitoring and social pressure in group-based lending mechanism. Since it is difficult to directly measure screening, monitoring, social pressure and social ties, we tried to solve this problem by creating proxy variables. In addition to these proxy variables for monitoring, screening, social pressure and social ties, the data set also includes control variables. These variables range from social, economic and demographic variables of the group members to data related to groups as a whole.

The questionnaire consists of two parts. The first part of the questionnaire was prepared for group members (from each borrowing group at least two members were interviewed) and the second part was directed towards the group leader. In total 351 group members were interviewed; 249 were regular group members, while the remaining 102 were group leaders.[1]

This chapter describes the data obtained through the survey. Section 5.2 describes the survey process. Section 5.3 is on members' loans and savings behavior. Section 5.4 deals with group formation, peer screening and social ties. Section 5.5 describes monitoring and enforcement. Section 5.6 deals with the control variables. The final section provides concluding remarks. Tables showing the descriptive statistics of the relevant variables are presented in appendices 5-A1 to 5-A5 to this chapter.

5.2 The survey process

The first version of the questionnaire was written in English and had to be translated into Tigrigna (one of the main Eritrean languages). We translated it and gave both the Tigrigna and English version to some colleagues at the University of Asmara. They provided some important comments and on the basis of these comments the questionnaire was modified.

Next, we visited the Ministry of Local Government to get permission to do the survey in the four selected zones. After contacting the relevant authority and after getting permission and the necessary supporting letters, we visited zonal administration offices that were located in these four zones. The authorities in the four administrative zones were very cooperative: they gave us permission to do our survey and asked their personnel to cooperate.

Next, we visited the head offices of the two MFIs that are active in Eritrea and met with the management. At this occasion we got the chance to convey our intentions and discuss with them the objective of our study.

[1] For a complete overview of the questions see the appendix to this thesis.

The heads of the institutions gave us the green light to carry out the survey with their clients and asked their personnel at subzonal offices to cooperate with us. After this contact, we visited some regional offices of these MFIs and for the first time we met with the regional managers, credit promoters and some borrowers. This first encounter was fruitful, as it gave us a first insight into the procedures used in the programs. We also discussed our questionnaire with the personnel of the program and received some important feedback.

The next step was to make a pilot survey and test the questionnaire by randomly selecting some localities. We did the test by interviewing some 30 borrowers from the two lending programs. After summarizing the results of the interview and discussing with some credit promoters, we decided to further modify certain questions to get the necessary information from borrowers. Once we made these modifications, we decided to start the main survey.

In order to conduct the survey, we had to recruit interviewers who were ready and able to assist us. We decided that candidates had to have a first degree in Economics or Business. The interviewers we found were either graduate assistants working at, or former graduates from the University of Asmara. Next, we organized a two days training program, explaining the questionnaire and the interview methodology. During this training session, we also exchanged some experiences we had during the pilot survey session with the trainees. The interviewers received 10 Nakfas[2] per questionnaire. In total, five interviewers were involved in collecting the data over a one year period. In the beginning of 2003 we went back to Eritrea, in particular to the field offices of the two Eritrean lending programs, to do some data verification and to conduct qualitative interviews with the officials of the programs and borrowers.

[2] On average an interviewer was able to do five interviews per day – earning 50 Nakfas. The daily salary for a graduate assistant in the University of Asmara during the survey period was approximately 55 Nakfas (before taxes) per day.

5.3 Possible caveats

The survey responses yielded numerous insightful results that may help to shed light on how group-based lending in Eritrea operates. However, we realize that information collected as described above may not always be precise, and this should be taken into account when interpreting the empirical results. We can summarize the possible caveats of our sample data as follows:[3]

- The interviewees may have incentives to give incorrect replies. We tried to minimize this possibility by consulting village bank and credit committee officials, credit promoters and reviewing program documents to verify the answers given by the respondents.
- Given the low average educational level of group members, one might say that this may lead to less confidence in the reliability of scores. However, the interviews were conducted face to face and were done with the help of well-trained and versed interviewers. As the interviewers were ready and willing to further illustrate and clarify any question, we believe that the amount of incorrect replies arising from this problem to be minimum.
- During the period 1998-2000 Eritrea was at a border war with Ethiopia. This may have negatively influenced the business performance of the interviewees and may have led to biased scores. Yet, the impact of the war may be less important for at least two reasons. First, we investigated activities of the Eritrean credit programs in regions of the country where the effects of the war were the lowest. Second, we started our survey in March 2001 to give the interviewees at least some time to recover from possible war effects.
- Most of the groups were at the early stages of loan cycles (the average loan cycle being 3.5 months) when we interviewed them. This may have biased our data. However, most of the relevant

[3] One of the referees pointed out the possible existence of problem of double observations in our data set. We believe that this is not a serious problem as most of the responses from our interviewees were their personal perceptions and experiences. They were not referring to universal facts. In our view, this reduces the chances of obtaining double observations.

information we required for the analysis has been acquired from the then current loan cycles.

- Several variables have a mean close to 1 or 0. While this is common in studies that use the type of survey data we did in our data set, it does imply that with-in sample variation for such variables arises from just a few observations. This may affect the reliability of the results. Yet, it is not clear to what extent this is of importance in our empirical results. Several of these variables have not been used in the analysis. As will be indicated in chapter 6, because of multicollinearity between different variables and because of a lack of variation of some of these variables we were forced not use them in the empirical analysis.
- In our empirical analysis we sometimes used group averages to represent individual group members. One may expect different results when using group median or mode rather than group averages. However, as the number of group members (excluding the group leader) is only two or three in most cases, using group averages better represents the underlying data.
- Many of the answers to our questionnaire are proxies concerning perceptions rather than verifiable facts. Therefore, one may expect systematic differences in behavior among group members.

5.4 Loans and savings

The data set in this section describes the financial contracts made between the two Eritrean microfinance programs and their clients. The data we collected includes the amount of loans forwarded to members, loan cycles and loan terms. Moreover, in this section we also present the purpose for which members used the loans they acquired. We also have data on members who faced repayment problems in the current loan cycle. Similarly, we collected information indicating the saving performance of groups. The loan and saving variables are not only used in measuring repayment performances, they can also be used in investigating the other research issues in our thesis.

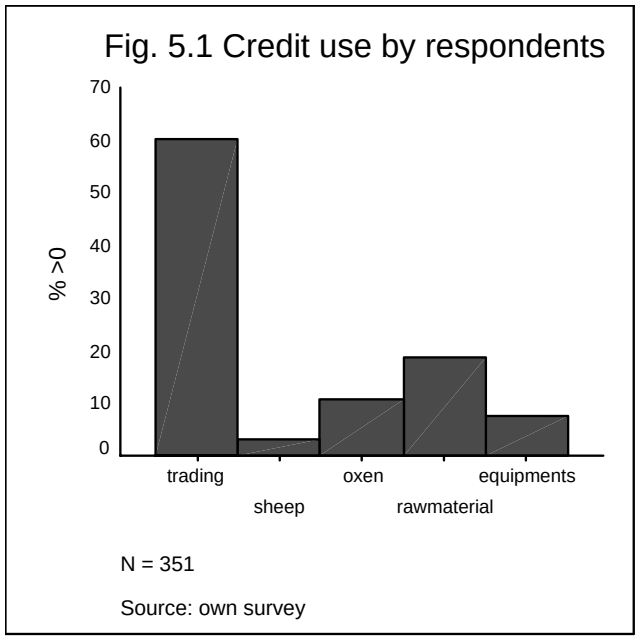
As table 5-A1 illustrates the number of loan cycles (or loan rounds) groups had completed until the interview period ranged from two to eight – the average being 3.6 loan cycles. The two lending programs had a savings program for their clients. Unfortunately, until the interview period both programs concentrated only on compulsory[4] rather than on voluntary saving. It is only recently (since 2001) that they have started to record voluntary savings in their yearly reports. The average compulsory group savings was 2,170 Nakfas, ranging from a minimum of 270 Nakfas to a maximum of 7,000 Nakfas. The average amount of loans provided to respondents during the interview period's loan cycle was 3,960 Nakfas, ranging from 750 Nakfas to 8500 Nakfas, with a median of 3,500 Nakfas. Repayments were on monthly basis and the loan terms varied from 3 to 24 months, with a mean of 13 and median of 12 months.

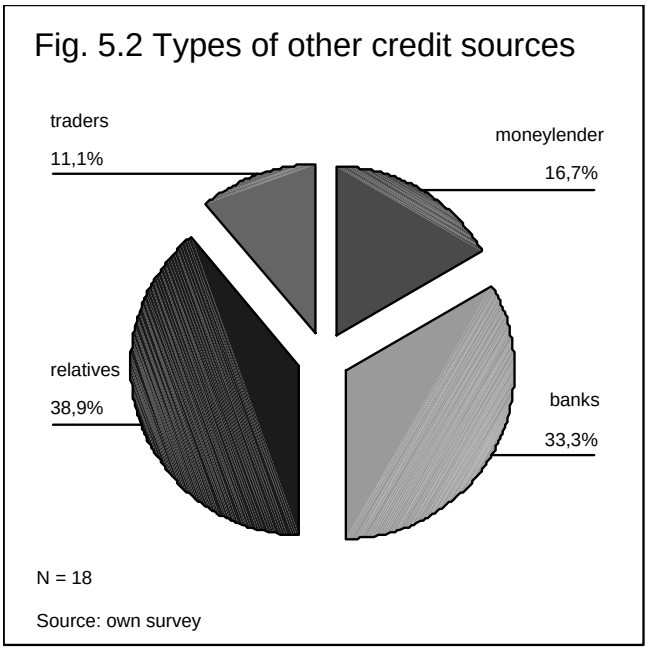
Figure 5.1 indicates what the borrowers have used their loans for. The majority of the sample borrowers (60.4 per cent) used the loan for trading purposes.[5] The borrowers who were engaged in farming stated that they had bought oxen (10.5 per cent) and sheep (3.1 per cent) for breeding purposes. The others had used the loan for purchasing equipments (7.4 per cent) and raw materials (18.5 per cent).

When asked whether they have other sources of credit only 18 respondents responded positively. Figure 5.2 shows the distribution of credit sources for respondents as banks with 33 per cent, moneylenders with 17 per cent, relatives with 39 per cent, and finally traders with 11 per cent. Most respondents (337) had never applied for a bank loan, and from the remaining 14 respondents 7 had applied for a bank loan and been rejected.

[4] Chapter 3 shows the amount of compulsory savings members have to pay before they can apply for loans.

[5] Trading is a broader term, including the retailing of different items ranging from food items, agricultural inputs and housing utensils to clothing and building materials.

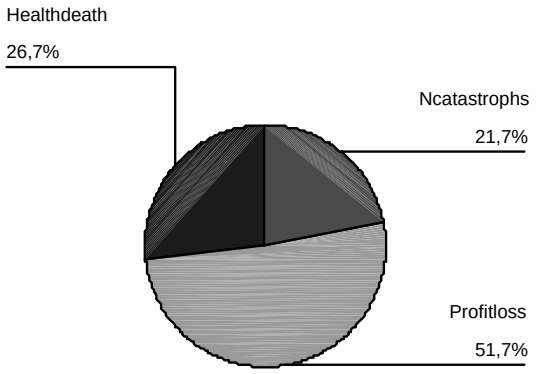




Among the respondents there were only 60 (17 per cent) borrowers who had repayment problems at least once during the current loan cycle; they gave different reasons for their repayment problems. As figure 5.3 shows, from the 60 borrowers who admitted to have had repayment problems, 13 respondents (21 per cent) gave profit loss and tough competition as the reason, 31 respondents (52 per cent) mentioned health problems and the

death of a family member, and 16 respondents (27 per cent) identified natural catastrophes as a reason for their problems. 23 of the borrowers with repayment problems admitted to have had certain help from other group members.

Fig. 5.3 Reasons for repayment problem



N = 60

Source: own survey

5.5 Group formation, social ties and screening

Participants in group-based lending programs may use peer screening and social ties to avoid including potential defaulters to their group. The degree of acquaintance between members before the formation of group and the length of time members have lived in the interview area is relevant information which may be useful in screening potential group members. The ability of members to acquire information on each other's creditworthiness before the formation of the group and their reasons for accepting each other is part of the screening process.

Some of the respondents were born and raised in the interview area, while others were newcomers to the district. It is assumed that the longer a member has lived in the area, the tighter his social ties with other members of his community are and also the better his screening and monitoring ability of potential members of his group is. 51 per cent of the respondents were born and raised in the interview area. As shown in table

5-A2 the average number of years respondents had lived in the interview area was 32 years – with a maximum of 77 years and a minimum of two years.[6]

From the total sample of borrowers 287 (82 per cent) respondents said to have known other members of their group before the group was formed. The remaining 64 (18 per cent) respondents stated to have had distant or vague acquaintance with some members of their group before the formation of the group; they gave different reasons for allowing these other members to join their group. From the 64 respondents 35 (54.5 per cent) allowed others to join their group because the applicants were friends or relatives of another group member. 23 (36 per cent) respondents said they let others join them because these potential members were doing well in their business, and the remaining 6 (9.5 per cent) allowed others to join them because of other reasons.

Most of the respondents (82 per cent) stated that they had known the behavioral integrity of their future group members before the formation of the group. A total of 64 interviewees admitted to have had little information about the integrity of the potential members, and from these 64 members 54 admitted to have have screened their potential fellow group members. From the 54 members 27 (50 per cent) did so by asking neighbors and friends, 17 (31 per cent) by asking relatives and 10 (19 per cent) by asking local traders and money- lenders.

5.6 Group monitoring and enforcement

Group members monitor each other's economic activity in order to check whether a member performs as he promised his group, so that the other members can mitigate moral hazard behavior among members. Thus, members for instance may visit each other frequently to find out what everyone is doing. Through our survey we gathered proxy variables that may indicate to what extent members were monitoring each other in

[6] 46 was the average age of the respondents; almost 69.5 per cent (32 divided by 46) of the respondents lived in the interview area.

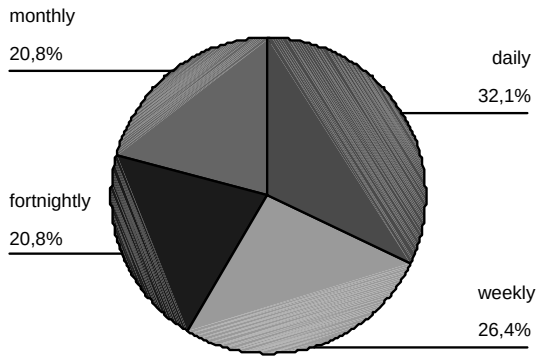
achieving their aims. Thus, these variables may help us to understand how the monitoring processes among group members works.

The average distance a group member lives or works from the other group members can affect his monitoring ability. The shorter the distance between a member and other members of his group, the higher the possibility for him to visit and see whether they are behaving themselves. As table 5-A3 shows, the average distance between members was 499 meters with a minimum of 5 meters and a maximum of 5,000 meters. After the borrowers have organized themselves into groups and start to acquire loans from the program, they have to have regular contact, to know who is doing what, to assess the credit needs of the others and to appreciate each other's economic activities. In order to obtain information on these issues we asked the borrowers in our sample whether they know the economic activity of other members in their group, whether they know for what purpose the other members have used their loan, and whether they know the monthly sales or income of other group members. If a member knows the business activities, purposes and monthly sales of other members, this might help him to mitigate the moral hazard behavior of these members. The majority (87.5 and 94.9 per cent) of the respondents answered positively to the first and second question, and 94.6 per cent of the respondents gave a negative answer to the third question.

Together with his group members each client of the two lending programs is obliged to be present at the monthly VB or credit committee meetings. Clients who fail to turn up at these meetings are penalized and have to pay a fee unless there is a good reason for their absence. We asked members if they visited other group members in their business or at home on a regular basis – besides this regular monthly meeting with the credit committee[7] and the credit promoter. The higher the frequency of visits of a member to other members, the more information he can gather on the member's activities and performances, and the easier it is for him to monitor him. In our sample 265 (75.5 per cent) gave a positive answer to this question. But as figure 5.4 shows, the frequency of these visits differs: from the total of 265 individuals 85 (32 per cent) said that they were neighbors and

visit each other on a daily basis, 70 (26 per cent) acknowledged that they visited other group members on a weekly basis, and the remaining 55 (21 per cent) said that they visited each other every fortnight or every month.

Fig. 5.4 Frequency of members visiting



N = 265

Source: own survey

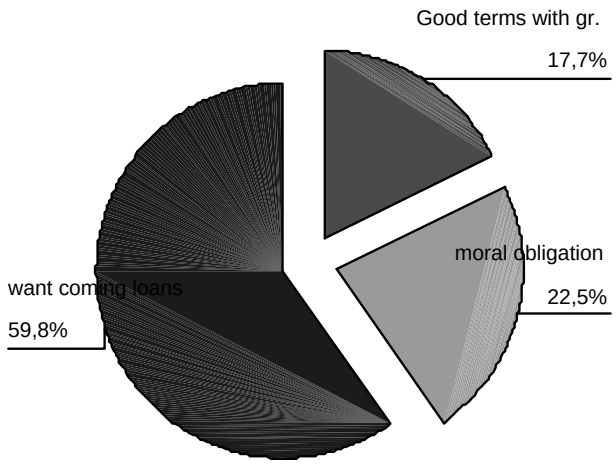
In group-based lending programs , members use different enforcement mechanisms (in order) to make sure that each person follows the agreed on principles and norms. Members use peer pressure to keep each other in line and enforce repayments after output has been realized. For this part of our study we collected variables that may help us to verify this function.

In this subsection we employed a number of questions that could be used as proxies for peer pressure. Concerning the question why they usually repaid promptly, figure 5.5 illustrates that 62 (17.6 per cent) respondents said that they did so because they want to stay in the other group members' good book; the other 79 (22.4 per cent) respondents acknowledged that they did so because they felt a moral obligation towards the other members of their group; a majority of 60 per cent said that they did so because they wanted to repay the current loan succesfully and gain access to larger loans. The respondents who said that they repaid promptly because they want to stay on good terms with the other members, meant that they were afraid of social sanctions by the others.

[7] In case of SMCP it will be a meeting with the officials of the VB.

The respondents who paid promptly because they felt a moral obligation, meant that they did not want to be the reason other members were unable to get future acces to loans by the programs.

Fig. 5.5 Reasons for prompt repayment

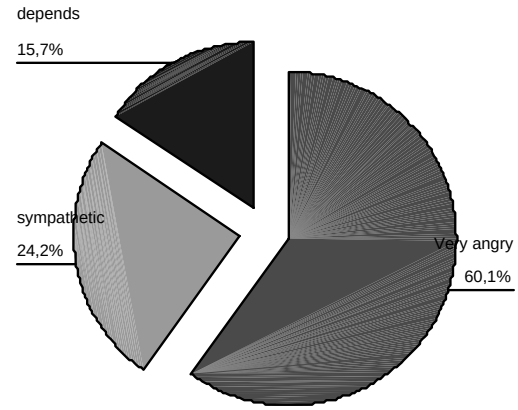


N = 351

Source: own survey

The kind of pressure members use against defaulting member(s) can vary from moral persuasion and gossip to hassling and social exclusion. The majority of respondents preferred moral presuasion and gossip to hassling and social exclusion, by a difference of 90 per cent. When asked how they would have reacted if a group member(s) had defaulted, the majority (211 respondents, i.e. 60.1 per cent) claimed that they would have become very angry, 55 (24.2 per cent) respondents stated that they would have shown sympathy, and 85 (15.7 per cent) respondents declared they would have tried to find out the cause for the repayment problem before they reacted at all – as is shown in figure 5.6.

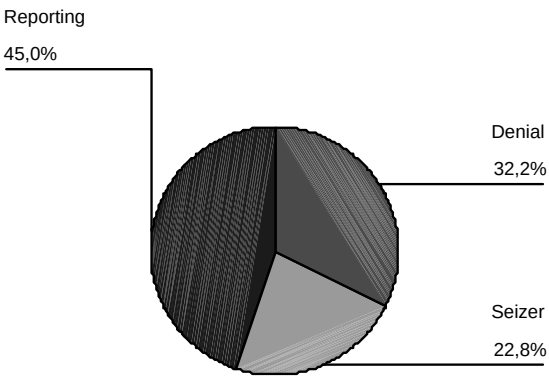
Fig. 5.8 Reaction against a defaulter



Source: own survey; N = 351

The groups have many pressure mechanisms they can use defaulting member, and these include denying him/her future loans and making him/her leave the group, seizing his/her assets and reporting him/her to the village or program officials. As figure 5.7 illustrates, from the above penalties the prevalent one – preferred by 158 (45 per cent) respondents – was reporting him to the village or program officials, followed by 113 (32.2 per cent) respondents who preferred denying the member future credit and making him/her leave the group. Only 80 (22.8 per cent) respondents said they would prefer to seize the defaulters' assets.

Fig.5.7 Type of penality on defaulter



N = 351

Source: own survey

Although the pressure mechanism may differ, the majority of the group members (95 per cent) showed their readiness and willingness to take sanctions against a member with repayment problems. The remaining 17 (5 per cent) respondents thought that it would be difficult to issue sanctions against defaulting members. There might be many reasons why they thought it would be difficult: perhaps the respondent does not want to spoil his/her relationship with the defaulter if, for instance, the defaulting member is a close relative, a very good friend or someone who has a powerful social position.

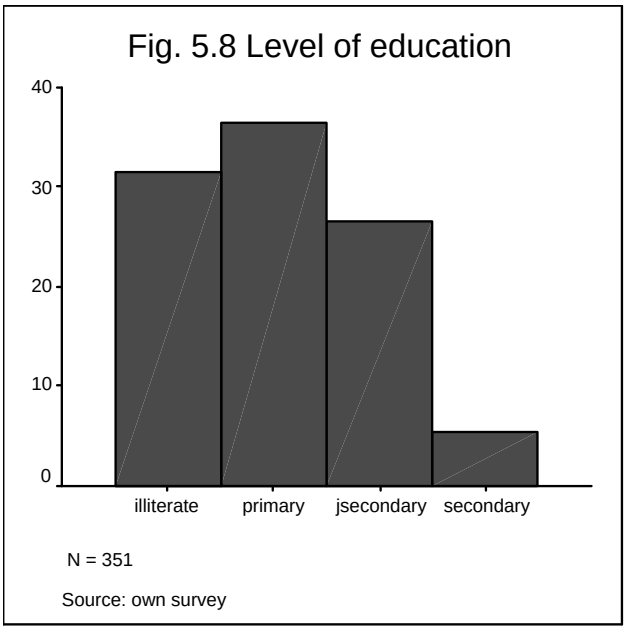
5.7 Control variables

Including these control variables is justified by the simple fact that we want to find out whether these variables can also influence our independent variables.

The set of control variables ranges from information on social, economic and demographic variables of the group members to variables describing characteristics at the group and/or program level.

From the total sample of 351 group members, 167 participated in the SZSCZ program, and the remaining 184 were involved with the SMCP. As table 5-A5 illustrates, the average borrower was 46 years old; while the youngest member was only 18 years old, the oldest one was 77. In our sample 196 (56 per cent) borrowers were female and 155 (44 per cent) were male. The majority (78 per cent) of the respondents was married and were Christians (80 per cent).

As figure 5.8 shows, the average borrower in the sample had an elementary level of education. 32 per cent of the respondents had no education and 36 per cent of them had only been to primary school. Only 5 per cent had ever attended a secondary school, and there were no members with a university education.



As table 5-A5 shows, the average monthly income of a borrower in the sample was 1017 Nakfas – ranging from a minimum of 300 Nakfas to a maximum of 1300 Nakfas.[8] Figure 5.9 shows that the majority of the interviewees were retail traders (63.5 per cent), followed by 17.1 per cent farmers; the rest was categorized as "others" and amounted to 19.4 per cent. These people could be engaged, for example, in services, daily labor, and manufacturing activities.

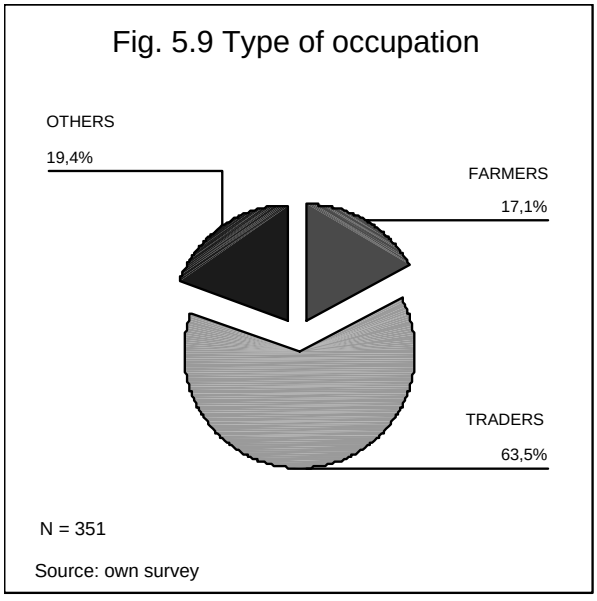
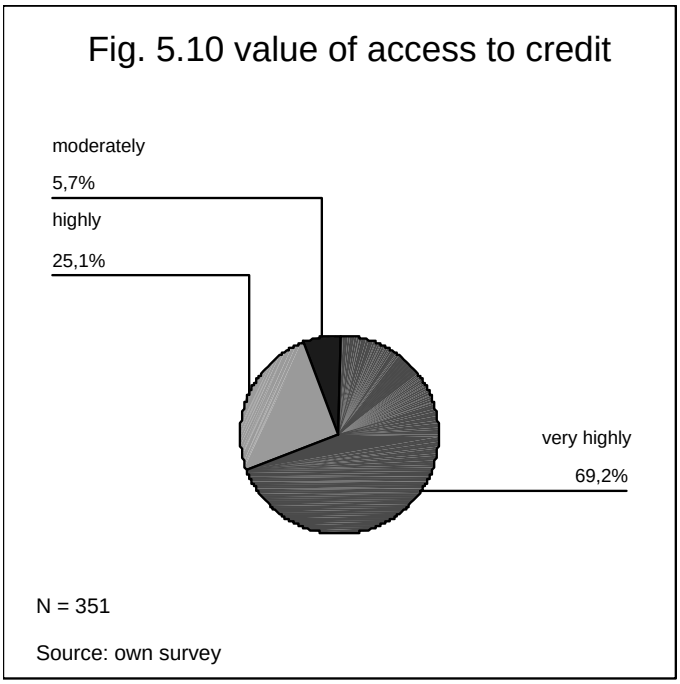


Table 5-A5 illustrates that the number of members in a group varied: the average was 4.5 members and the median was 4, ranging from a minimum of 3 and a maximum of 8 members. We have interviewed an average of 3.2 members in a group with at least 2 and at most 6 members. The groups in the sample were divided into three groups, based on the gender combination. 33 groups (32.3 per cent) were all- female, 26 groups (25.5 per cent) were all male, and 43 groups (42.2 per cent) were of mixed gender.

We can assume that borrowers who want to have future access to credit from group-based lending programs rate these services highly; therefore, they will be less tempted to break the rules of the program and they will pay back their loans in time. The borrowers in our sample answered the question how they valued future access to loans by the programs; they were to use a scale of 1 to 4, ranging from "valuing future access to loans very highly" (1) to "not at all" (4). As we can see in figure 5.10 the majority of the borrowers in our sample (69.2 per cent) said they valued future access "very highly", while 25.1 per cent said they valued it "highly". The remaining respondents – just 5.7 per cent – said that they value future access moderately (3); no one gave gave a value of 4 ("not at all"). 29 groups (28 per cent) reported to have internal group regulations and agreements, which could help them manage their group.

[8] Eritrean per capita gross national income (GNI) is just 180 US dollars. The official exchange rate during the survey period was 14.5 Nakfas to a dollar.



Every group has a leader, and every leader has certain duties and responsibilities. Members were asked how they value their leader, and 48 per cent of the respondents said that their leader was very good, 50 per cent said that their leader was good, and only 2 per cent did not think their leader was bad.

5.8 Conclusion

This chapter provides a descriptive statistical data of the sample of respondents, which covers the two Eritrean group-based lending programs and helps to shed some light on these programs. It shows that the borrowers represent both genders, cover almost the entire age spectrum, and come from both rural and urban parts of Eritrea. It also shows that most borrowers are illiterate or semi-illiterate members of Eritrean society, representing the majority of the Eritrean population. The monthly average income of our respondents seems to be higher than the Eritrean gross national per capita income. This may indicate that the two Eritrean MFIs have not yet fully embraced the poorest of the poor of Eritrea.

Followers of the Islam are underrepresented in the sample, even though according to official statistics published by the US Department of State 48

per cent of the Eritrean population consists of Muslims. This is because the microfinance schemes were introduced relatively late to the regions that are dominated by Muslims. At the time of our survey, 2001, most of the programs in these parts of Eritrea were still in their infancy and they were not included in our sample.

Similar to other MFIs around the world, most of the participants of the programs are active in retail trading rather than in farming and manufacturing.

As is the case with other group-based lending programs worldwide, the two Eritrean programs forward small amounts of loans with a short term and with frequent repayments. Moreover, the majority of the borrowers does not have proper access to credit from other sources and depends on these programs for their credit needs. The majority of the borrowers uses the loans for trading purposes, and they have compulsory and voluntary savings accounts with the programs.[9]

When it comes to peer screening, peer monitoring and social ties, borrowers seem to know each other before the formation of groups and they continue to monitor each other after the formation. The data we collected also shows that the members have social ties with each other since most of them have lived in the interview areas for a long period of time and know each other very well. Concerning the peer pressure variables, our result seems to show that group members prefer to use persuasion to make other members repay rather than harsh measures like sanctions.

[9] The promotion of voluntary savings is a new phenomenon.

APPENDIX: Description of sample data

Table 5-A1 Credit and savings

	%	Mean	Median	Max	Min	Std.dev.	Obser.
CREDIT AND SAVINGS							
LOAN CYCLES		3.60	3.00	8.00	2.00	1.108	351
GROUP SAVINGS		2170	2000	7000	270	1480	351
CURRENT CREDIT (VALOAN)		3960	3500	8500	750	1800	351
LOAN TERMS (months)		13.12	12	24	3.0	5.78	351
CREDIT USE							
1. equipment	7.4						351
2. oxen	10.6						351
3. raw material	18.5						351
4. sheep	3.1						351
5. trading	60.4						351
Have you been ever refused a loan by a bank?							
Yes	2						351
No	2						351
Never applied for a loan before	96						351
OTHER CREDIT							18
SOURCES OF OTHER CREDIT							
1. bank	33						18
2. moneylenders	17						18
3. relatives	39						18
4. traders	11						18
AMOUNT OF ARREARS		1350	985	5000	100	1181	60
REASON FOR ARREARS							
1. business competition	52.0						60
2. health/death	26.0						60
3. natural calamities	22.0						60

Source: own survey

Table 5-A2 Group formation and social ties

	%	Mean	Median	Max	Min	Std.dev.	Obser.
BORN IN THE AREA (BOGROUP)		0.51					351
No. OF YEARS LIVING IN THE ARE (LIVE)		32	31	77	2	19.31	351
KNOW MEMBERS (KNMEMDUM)		0.81					351
REASONS FOR ACCEPTING							
1. Rfaccepting1	58.0						64
2. Rfaccepting2	34.0						64
3. Rfaccepting3	8.0						64
CHANGE GROUP (CHGROUP)		0.10					351
INTEGRITY		0.82					351
SCREENING		0.15					351
WHO DID THEY CONSULT							
1. Neighbors/friends	50						54
2. Relatives	31						54
3. Moneylenders	19						54

Source: own survey

Table 5-A3 Description of sample data; group monitoring

	%	Mean	Median	Max	Min	Std.dev.	Obser.
DISTANCE in meters (DIST)		499	200	5000	5	862	351
KNOW ACTIVITIY (KNACTDUM)		0.87					351
KNOW PURPOSE (KNPURPDUM)		0.94					351
KNOW SALES (KNSELDUM)		0.05					351
VISIT (VISTDUM)		0.76					351
FREQUENCY OF VISITS							
1. daily	32						265
2. weekly	26						265
3. fortnightly	21						265
4. monthly	21						265

Source: own survey

Table 5-A4Description of sample data; group pressure

		%	Mean	Median	Max	Min	Std.dev.	Obser.
REASONS FOR PROMPT REPAYING								
1.	good terms with group	17.7						351
2.	feel moral obligation	22.5						351
3.	want forthcoming loans	59.8						351
FORM OF PRESSURE								
1.	Moral persuasion & gossip	90						351
2.	Hassling & exclusion	10						351
REACTION TOWARDS AGAINST A DEFAULTING MEMBER								
1.	very angry	60.1						351
2.	sympathetic	24.2						351
3.	Depends	15.7						351
PENALTY FOR A DEFAULTING MEMBER								
1.	denial of future access	32.2						351
2.	reporting to authorities	45.0						351
3.	seizure of assets	22.8						351
READY FOR SANCTIONS			0.95					351
REASON FOR NOT SANCTIONING			0.04					351

Source: own survey

Table 5-A5 Control variables

PERSONAL CHARACTERISTICS								
		%	Mean	Median	Max	Min	Std.dev.	Obser.
AGE (years)			46	45	77	18	11	351
INCOME*			1017	1000	1300	300	751	351
GENDER	male	44						351
(GENDUM)	female	56						
RELIGION	Muslim	20						351
	Christian	80						
MARITAL	married	78						351
STATUS	other	22						
EDUCATION								
1. illiterate (ILLIT)		31.5						351
2. primary (PRIM)		36.5						351
3. j.secondary (JSEC)		26.5						351
4. secondary (SEC)		5.5						351
OCCUPATION								
1. trader		63.5						351
2. farmer		17.1						351
3. other		19.4						351
BORROWING	SMCP	45						102
GROUPS	(ACORDUM)							
	SZSCS	55						102
VALUE OF ACCESS (VFACCESS)								
1. very high		69.0						351
2. high		25.3						351
3. moderate		5.7						351
GROUP AGREEMENT (GRARDUM)			0.28					102
GROUP	very good	47.5						249
LEADER	good	49.5						249
QUALITIES	poor	3.0						249
NUMBER OF MEM# (AMOUNT)			3.18	3	6	2	1.012	351
NUMBER OF MEM$ (NOMEM)			4.48	4	8	3	1.426	351
ALL-FEMALE GROUPS			0.32					102
ALL-MALE GROUPS			0.25					102

Source: own survey

Notes:

* All money amounts are in Nakfas, Eritrean legal currency

Number of members interviewed from each group

$ Number of members in each group

Chapter 6 Determinants of Repayment Performance of Group-based Lending Programs

6.1 Introduction

As discussed in chapter 2, in recent years MFIs have shown an excellent repayment record and are becoming a widely used instrument to provide loans to the poor. Some of these programs have been showing sustainability and extensive outreach to the poor while maintaining high repayment.

The performance of group-based lending programs can be gauged through their outreach to the poorest of the poor, their sustainability and their repayment performance. The focus of this chapter will be on exploring the determinants of repayment performance, taking the case of the two Eritrean microfinance programs.

The effect of joint liability on repayment performance has been theorized widely, attributing higher repayment rates to some of the characteristics of group-based lending, namely peer screening, peer monitoring and enforcement mechanisms. Empirical evidence on the determinants of repayment performance of joint liability lending has shown that peer screening, peer monitoring and enforcement mechanisms do play a role in minimizing repayment problems among group-based lending programs. In this chapter, we add to the empirical literature by testing the dependent variables by splitting up our independent variables into those related to the group leader and those related to the other group members.

The objective of this chapter is to investigate whether the repayment performance of the two Eritrean group-based lending programs is positively influenced by peer-screening, monitoring and enforcement mechanisms – more specifically whether splitting up the independent variables into those related to the group leader and those related to other group members gives a different result than the joint liability lending theory indicates. The chapter will be divided into five sections. Section

6.2 provides a brief review of empirical literature. Section 6.3 focuses on the empirical model we use, and section 6.4 discusses the empirical results. Section 6.5 provides the conclusions.

6.2 Group-based lending and repayment performance: a literature review

One of the measuring devices for the success of group-based lending program is its rate of repayment. Successful programs like the Grameen Bank and the Bancosol show high repayment rates, while reaching millions of poor borrowers. The high repayment performance of these institutions is attributed to their ability to curb the problems arising from asymmetry of information. As mentioned in the literature, group members in joint-liability group-based lending programs screen, monitor, and pressure each other in order not to end up paying for their defaulting colleagues.

Most of the theoretical literature on group-based lending does not deal directly with repayment performance of programs: theoretical models emphasize the role group members play in alleviating adverse selection, moral hazard and enforcement problems. These models have been reviewed extensively elsewhere (see, e.g., Ghatak and Guinnane, 1999; Morduch, 1999b), and there is no need to repeat them here. Accordingly, we concentrate on reviewing available empirical research on repayment performance. Indeed, several studies have empirically analyzed the determinants of group repayment performance. We will shortly discuss the results of these studies below.

Wenner (1995) uses data of 25 groups from FINCA in Costa Rica. He categorizes his data into three types: groups with no loan delinquency, groups with internal loan delinquency only, and groups with external delinquency. Internal delinquency means that one (or more) member(s) did not repay his (their) share, but the group did meet its obligation to the lender. External delinquency means that the group failed to repay to the lender (thus both internal and external delinquency has occured). Consequently, Wenner has two dependent variables, namely internal

delinquency and external delinquency. Binomial probit, multinomial logit, and Tobit models are used in the analysis. Independent variables measure group characteristics such as informal[1] and formal screening, group savings and other variables such as the group's organizational strength, infrastructure indexes and visits by program officers to groups.

Wenner finds internal delinquency to be related negatively with formal screening and positively with visits. The former suggests that groups who have written codes on how members should behave (formal screening) experience less internal delinquency. The latter result, i.e. visits by credit officer to groups, indicates that more visits generate more internal delinquency, which seems to be an unexpected result. Wenner suggests that a higher number of visits might reflect extra attention given to a perceived 'problem' group. In case of external delinquency he finds formal screening to be negatively related and significant, and informal screening and infrastructure indices to be positive and significant. These results indicate that groups with a written code of group rules and regulations show less external delinquency. On the other hand, groups that are located in areas with good infrastructural facilities show higher external delinquency, indicating that these groups may alternative sources of credit. Informal screening is found to have an unexpected sign, i.e. informal screening instead of being a check against delinquency is positively correlated with delinquency.

Sharma and Zeller (1997) use data of 128 groups from four group-based lending programs in Bangladesh. Their dependent variable is the delinquency rate defined as the proportion of the total loan amount in arrears at the date when repayment should be completed. Their independent variables are related to group, community and lender characteristics. Each of the independent variables is multiplied by loan size. Using a Tobit model they find the following results. The number of

[1] The informal screening variable has a value of 1 if the individual belonged to a group that screened according to reputation. The formal screening variable has a value of 1 if the individual belonged to a group that had a written code of regulations.

relatives in a group, squared credit rationing[2] and size of loans are found to be positively significant. This result indicates that the more relatives in one group and the higher the degree of credit rationing, the higher the percentage of unpaid loans. Similarly, the larger the value of loans forwarded to members, the higher seems to be the burden, forcing members to delay payments. The findings in case of relatives in a group and squared rationing suggests that relatives in one group, rather than improving peer pressure through social ties, seem to collude against the lender, which can lead to delays in repayment. Likewise, if rationing becomes higher than a specified cut-off level, group members may no longer see the program as a long-term partner and start to delay repayment.

On the other hand, credit rationing, agriculture as a main occupation, variance of land ownership and group initiation, are found to be negatively significant.[3] The results point out that a lower level of credit rationing may generate a greater concern for protecting future access to credit and a lower percentage of unpaid loans. Similarly, groups formed through self-initiation processes may make screening more effective and show better repayment performance. Also, groups with more members who say that agriculture is their principal occupation produce a lower percentage of unpaid loans, indicating that borrowers practicing agriculture may show a better repayment performance. A high degree of variance of land ownership among members leads to a lower percentage of unpaid loans, suggesting that the greater the portfolio diversity of land ownership among members, the lower the covariance of incomes within the group and the higher the repayment rate.

Matin (1997) uses data of 246 borrowers from the Grameen Bank in Bangladesh. His dependent variable is a dummy variable, which equals 1 if the loan is not fully repaid at the due date. He uses independent variables indicating the borrowers' level of education, area of land used,

[2] The square of credit rationing was used to account for possible non-linearity. Rationing is computed as the difference between the value of the loan applied for and the actual value of the loan received.

[3] This variable indicates who imitated the group formation of a group.

years of membership, alternative credit sources, and several other personal characteristics. Using a logit model Matin finds that education and the area of operated land were negatively significant, suggesting that groups that consist of members who have some schooling and who have land in use below a certain threshold value are less likely to show repayment problems.

In contrast, Matin finds that having a housing loan, the length of membership, other credit sources and total land in use beyond the threshold level are positively significant. These results imply that a member with a housing loan might be burdened by this loan and show delays in his repayments. Similarly, the results indicate that members who have been clients of the lending program for many years might show some slackness in their repayment. Moreover, members who have other credit sources and who have land use above the threshold level have a higher probability of showing repayment problems. This may be attributed to the fact that these borrowers have other credit opportunities or that they have already accumulated so many assets that they value future access to loans from the program less.

Zeller (1998) uses data of 146 groups from six group-based lending schemes in Madagascar. The dependent variable he uses is the repayment rate. Zeller divides the independent variables into community,[4] lender and group variables. Using a Tobit regression model he finds the degree of monetarization, density of input retailers, saving service, group size, and coefficient of variation of land holding in upland rice region, social ties, and internal group rules to be positively significant. These results imply that groups located in areas with high levels of monetarization and a higher density of input retailers show higher repayment rates. Similarly, groups belonging to programs with saving service display higher repayment rate, indicating that saving may increase the financial discipline of group members and/or serve as loan collateral. An increase

[4] The community level questionnaire includes questions on topics like infrastructure, the community's exposure to risks, access to agricultural input and output markets, the degree of commercialization of major crops, and the existence of informal and formal financial institutions.

in the size of groups can promote economies of scope, scale and risk management. Yet, as has been discussed elsewhere, increasing the size of a group beyond a manageable level may decrease the internal flow of information and increase the cost of monitoring. In this case, however, group size is found to increase the repayment rate. The maximum group size allowed in the sample is ten members. Therefore, the problems related to larger groups may not occur. Similarly, groups with stronger social ties and groups with internal rules and regulations show better repayment rates. Moreover, groups with a higher coefficient of variation of ownership[5] of landholdings show higher repayment rates. This indicates that diversification reduces covariate income risks among group members, which increases the rate of repayment. Yet, the squared coefficient of variation of ownership of upland is negatively significant, which suggests that too much diversification of land owned by group members increases the costs of monitoring, which reduces the repayment rate.

Wydick (1999) uses data of 137 groups from FUNDAP, a group-based lending program in Guatemala. The dependent variable is a dummy variable equaling 1 if a group has a good repayment record (based on lender reports). The independent variables are classified into group social ties, group pressure, and group monitoring and control variables. From several independent variables Wydick finds average distance and knowledge of weekly sales of other members to be the only significant variables. Both variables are peer-monitoring proxies, which were negatively and positively significant, respectively. The results suggest that the longer the average distance in kilometers between group members' businesses, the weaker the monitoring ability and the lower repayment rate. Concerning knowledge of the weekly sales of other members, members are asked if they know the sales of other group members; Wydick find that the more group members know each other's weekly sales, the better the enforcement ability and the higher repayment rate of the group.

[5] The coefficient of variation of land holding is used to show intragroup risk pooling and diversification of portfolio.

Paxton et al. (2000) use data of 140 groups from PPPCR, a group-based lending program in Burkina Faso. They use a two stage econometric model. The dependent variable in stage one is the individual member's repayment problems; in stage two it is the repayment of the loan through group solidarity. This separation of the dependent variable follows from the structure of the survey they used. The groups were asked whether a member had repayment problems, and if yes, whether or not group solidarity led to repayment of the loan.

In stage one group homogeneity[6] and the group domino effect are found to be positively, and living in urban areas was negatively significant. The results indicate that the higher the degree of homogeneity and the higher the tendency of domino effect of members in a group, the higher the group repayment problems. The positive relationship between group homogeneity and repayment problems indicates that social networks due to the homogeneity of groups does not lead to higher group repayment performance. In contrast, group homogeneity seems to help groups to collide against the lender. Likewise, as more members within groups and other groups start to default, more repayment problems arise, indicating that even members who were able to repay begin to shirk, based on the idea that the marginal benefit of shirking exceeds the marginal benefit of repaying. Similarly, groups in rural areas tend to show higher repayment problems. This may be due to the high degree covariate risk associated with rural agricultural activities in Burkina Faso, forcing members to default during bad harvest seasons.

In stage two group leaders' quality, group training, living in urban areas, other credit sources and group pressure are positively significant, and the local domino effect and the amount of loan cycles are negatively significant. The outcomes point out that groups having higher leadership quality, better training and more peer pressure show higher repayment performance. Similarly, groups in urban areas and with other credit sources also show a better repayment performance. However, groups in areas where many other groups have already defaulted tend to show bad

[6] Homogeneity is a scale variable describing the similarity of group members in terms of gender, income, ethnicity, occupation, etc.

repayment performance. Similarly, with the increase of the amount of loan cycles the repayment performance of groups deteriorates.

Karlan (2001) uses data on 56 groups from GINCA, group-based lending programs in Peru. The dependent variable is the percentage of unpaid loan amount at the due date. The independent variables are categorized into geographical concentration of members, cultural similarity among members, and control variables. Using a Tobit analysis Karlan finds that geographical concentration and cultural similarities were negatively significant, suggesting that the shorter the average distance between group members and the higher the cultural similarity between them, the lower the percentage of unpaid loan amounts at the end of the first cycle.

In conclusion, empirical studies show that screening, monitoring and enforcement within groups may improve repayment performance. A summary of the empirical studies can be found in the appendix: tables 6-A2 and 6-A3.

6.3 The empirical model

The empirical studies described in section 6.2 are different from our own analysis discussed in sections 6.3-6.4, in the sense that most other papers use data acquired only from one group member as a representative of his/her group. We however have data from at least two members of each group. One of these members is the group leader and the others are members other than the group leader. This allows us to split the information for the independent variables into two separate variables, one related to the group leader and one related to the other group members excluding the group leader.

In our analysis we use three different dependent variables: ARREAR 1, ARREAR 2 and ARREAR 3. All three variables are dummy variables with a value of 0 or 1. ARREAR 1 has a value of 1 if at least one member of a group indicated that he has had repayment problems in the current loan cycle. ARREAR 2 has a value of 1 if at least one member of a group other than the group leader indicated that he has had repayment problems

in the current loan cycle. ARREAR 3 has a value of 1 if the group leader indicated that he has had repayment problems in the current loan cycle. If any of the dependent variables (ARREAR 1, ARREAR 2 or ARREAR 3) is equal to 1, this indicates that at least one group member (or group leader in case of ARREAR 3) reported to have had repayment problems.

We use a logit model to estimate the effects of independent variables in reducing the incidence of repayment problems. These independent variables are grouped into measures of peer monitoring, social ties, peer screening, peer pressure, and other control variables. Table 6-1 provides a complete list of the variables used in the analysis. For each of these variables we use two different versions, those related to the group members, excluding the group leader, and those related to the group leader. As indicated, the reason why we use these two different versions of the independent variables is that group leaders in the two Eritrean programs appear to play an important role in coordinating the activities of the group members and are representatives of the group to the programs (see also chapter 7 of this thesis). Consequently, we want to investigate whether monitoring, screening, pressure and social ties of group leaders affect the repayment performance differently than the other group members. The variables related to group members other than the group leader are given in averages; this is not the case for variables related group leaders.

In the first step of the empirical analysis we aim to use all variables listed in table 6-1 in our empirical investigation. Yet, it turned out we were forced to drop several variables because of the high correlation between some variables. Moreover, some of the variables showed very low variability, so that it was not very useful to include these variables in the analysis. Therefore, in the analysis we only use a subset of the variables listed in table 6-1. Unfortunately, due to the data problems variables measuring screening and pressure had to be deleted from the complete list of variables.[7]

[7] The full description and correlation analysis we performed to obtain a subset of variables with which we are able to carry out the empirical analysis is presented in the appendix to this chapter, table 6-A4.

Table 6-1Description of relevant variables

PEER-MONITORING	
DIST	= The average distance (in meters) between the group member and other members of the group.
KNACTDUM	Dummy = 1 if group member knows the activities of the other group members.
KNSELDUM	Dummy = 1 if the group member knows the monthly sales of the other group members.
KNPURPDUM	Dummy = 1 if the group member knows for what purpose the other members used the loan.
GRAGRDUM	Dummy = 1 if the groups has rules and regulation on how the group should be run.
VISTDUM	Dummy = 1 if the group member regularly visits other group members.
SOCIAL TIES	
BOGROUP	Dummy = 1 if the group member was born in the same area where the survey is held.
KNMEMDUM	Dummy =1 if the group member knew the other group members before forming the group.
CHGRDUM	Dummy = 1 if the group member has ever been a member of another group.
LIVE	= The number of years the group member has lived in the survey area.
PEER-PRESSURE	
PREDEDUM	Dummy = 1 if the member is ready and willing to pressure other members into repaying.
PREFLING	= How the member feels against defaulting member – anger or sympathy.
PREWDUM	Dummy = 1 if the member thinks sanctioning others is hard.
PEER SCREENING	
INTEGRITY	Dummy = 1 if the member knows the creditworthiness and behavioral integrity of the other members.
PERSONAL CHARACTERISTICS	
AGE	= Age of the group member (in years).
GENDUM	Dummy = 1 if the group member is male.
EDUCATION	= Educational background of the group member, ranging from 1 (illiterate) to 4 (secondary school).
MOSLDUM	Dummy = 1 if the group member is a Muslim.
MARDUM	Dummy = 1 if the group member is married.
INCOME	= Monthly income of the group member (in Nakfas).
CONTROL VARIABLES	
SAMESEX	Dummy = 1 if all group members are of the same sex.
VFACCESS	= The value a group member attaches to having access to loans from the credit program in the future, ranging from 1 (very high) to 4 (very low).
ACORDUM	Dummy = 1 if group member is from SZSCS (Eritrean MFI).
OTHCREDIT	Dummy = 1 if the group member has other sources of credit.
VALOAN	= Value of loan the group member has received in the current loan cycle.
NOMEM	= The number of members in a group.
AINSTAPA	= The monthly repayment of the group member as a percentage of his income

The list of variables used in the analysis is given below. First, we discuss eight “group leader”-specific variables:

- KNMEMDUM = 1 if the group leader knew the other group members before the group was formed;
- AGE = the age of the group leader;
- DIST = the average distance (in meters) between the homestead or business location of the group leader to the other members of the group;
- LIVE = the time (in years) the group leader has lived in the area were the interview was held;
- AINSTAPA = the monthly repayment of the group leader as a percentage of his income;
- VFACCESS = the value the group leader attaches to having access to loans from the lending program in the future, ranging from 1 (very high) to 4 (very low);
- VISTDUM = 1 if the group leader regularly visits the other members of his group;
- EDUCATION = the educational background of the group leader, ranging from 1 (illiterate) to 4 (secondary education).

In addition to these “group leader”-specific variables we have the same eight variables for the other group members. The variable names of these variables are similar; yet, the prefix AV- and the affix -NGL (“not the group leader”) are added to the above mentioned variables, indicating that they refer to averages of other group members.

Second, we use two variables that provide information on the group as a whole:

- GRAGRDUM = 1 if the group has rules and regulation on how the group should be run;
- NOMEM = the number of members in a group.

To summarize the above discussion, we include 18 independent variables (8 leader-specific, 8 non-group leader-specific, 2 group-specific variables) in our empirical model. This model aims at explaining the relationship between repayment performance (ARREAR) on the one hand and

member- and group-specific characteristics on the other hand. The independent variables consist of variables reflecting peer monitoring, social ties and other member characteristics.

The variables DIST, and VISTDUM are related to peer monitoring. They indicate the extent to which group members have information of each other, which may help them to monitor. For DIST we expect the coefficient to have a positive sign: the longer the distance between a member and other group members, the more difficult it is for a member to monitor his peers and the greater the repayment problems. For VISTDUM we expect the coefficient to have a negative sign: if the dummy is equal to 1, the probability of repayment problems falls, since the more a group member visits other group members, the higher is the opportunity to monitor their behavior. The variable GRAGRDUM is also related to peer monitoring and enforcement but refers to the group as a whole. For GRAGRDUM we expect to find a negative sign: if the dummy is equal to 1, this indicates that the group uses rules and regulations and this helps to reduce the probability of repayment problems.

In addition to the above variables, we have two other variables that assess the existence of social ties: KNMEMDUM and LIVE. These variables show the degree to which individuals within a group have lived in the same vicinity and know each other before the formation of the group. Such information may help group members to screen and monitoring each other's behavior before group formation and to use social sanctions against delaying members, which helps to mitigate repayment problems.

For KNMEMDUM and LIVE we expect a negative sign of the coefficient: if the dummy for KNMEMDUM is equal to 1, it indicates that the interviewee knows the other members, which increases the existence of social ties and reduces the chance of repayment problems. Similarly, for LIVE the longer a group member has lived in the vicinity, the greater his social ties and the lower the probability of repayment problems.

Finally, we have six control variables: AGE, EDUCATION, NOMEM, AINSTAPA and VFACCESS. The variable NOMEM refers to the size of

the group as a whole. For NOMEM we have no explicit expectations: it may have a positive or negative sign depending the theoretical model used/applied.[8] For AINSTAPA we expect to find a positive sign: the higher the amount of a member's installment as a percentage of his income, the more likely it is that this person will have to not cope with repayment problems. For VFACCESS we expect a negative sign: the higher members value future credit assess from the lending program, the lower the chance of repayment problems. Concerning AGE and EDUCATION we have no clear expectations about the sign of the coefficient.[9]

6.4 Empirical results

As is discussed above, the main aim of this chapter is to investigate whether monitoring and enforcement within group-based lending contracts play a role in mitigating the incidence of repayment problems of groups in Eritrea. The analysis is carried out as follows. We start by estimating the complete model, using logit analysis. The model includes all 18 independent variables discussed above. Next, we delete variables from the model for which we do not find significant coefficients, until we find the best fitting model, that is, the model including only significant coefficients. To achieve this, we delete those variables for which the Z-statistic of the coefficient is less than one. Tables 6-2, 6-3 and 6-4 provide the results of the empirical analysis. The Z-statistics are given in parentheses.

Table 6-2 shows the results when using ARREAR 1 (repayment problems of all members of a group) as the dependent variable. Equations 2-1 to 2-3 show that some of the variables have statistically significant coefficients, indicating that these variables play a role in mitigating repayment

[8] Theories suggest that the larger the group size, the higher the probability of members to show group solidarity, leading them to support a member in repayment problem (Devereux and Fisher, 1993). On the other hand, the larger the group size, the lower the degree of monitoring among group members, as the chance of free riding increases, which leads to an increased chance of of repayment problems (Armendáriz De Aghion, 1999).

problems. From the variables related to the group leader KNMEMDUM is significant with the expected sign. The other group leader variable found to be statistically significant is VFACCESS, indicating that the higher group leaders value future access to loans from the program, the higher the repayment performance by the group. From the variables related to group members other than the group leader most of them fail to be statistically significant. The only exception is AVINSTNGL, which persists to be statistically significant with the right sign in all equations shown in table 6-2. This variable indicates that the higher the install payment burden of regular group members as a percentage to their income, the higher the probability of repayment problems.

Table 6-3 presents the results when we use ARREAR 2 (repayment problems of group members other than group leader) as our dependent variable. From the variables related to the group leader KNMEMDUM and LIVE are statistically significant. Yet, LIVE has the wrong sign and is therefore dropped from the model in equation 3-2. The other group leader variable found to be statistically significant is VFACCESS with the right sign. From the variables related to group members other than the group leader most of them fail to be significant with the exception of AVINSTNGL and AVKNMNGL. Yet, AVKNMNGL has the wrong sign and is therefore dropped from the model in equation 3-2. AVINSTNGL appears with the expected sign, indicating that the higher the install payment burden of regular group members as a percentage of their income, the higher the probability of repayment problems.

[9] The complete list of variables used in the analysis with their expected signs is presented in the appendix to this chapter, table 6-A5.

Table 6-2Logit estimation results using ARREAR 1 as the dependent variable

	2-1	2-2	2-3
GROUP LEADER VARIABLES			
KNMEMDUM	-1.946 (-2.608)***	-1.292 (-2.024)**	-1.192 (-1.948)*
AGE	0.018 (0.722)		
DIST	0.001 (1.118)	0.001 (1.106)	
AINSTAPA	1.025 (0.791)		
VFACCESS	0.953 (2.014)**	1.121 (2.654)***	1.082 (2.684)***
VISTDUM	-0.101 (-0.189)		
LIVE	0.010 (0.561)		
EDUCATION	-0.145 (-0.412)		
OTHER GROUP MEMBERS			
AVKNMNGL	1.650 (1.825)		
AVDISTNGL	-0.864 (-0.171)		
AVAGENGL	-0.021 (-0.642)		
AVLIVNGL	0.015 (0.849)		
AVINSTNGL	2.122 (1.575)*	2.400 (2.536)**	2.376 (2.485)**
AVFACNGL	0.224 (0.630)		
AVISTNGL	-0.748 (-1.099)	-0.443 (-0.703)	
AVEDUNGL	0.177 (0.455)		
OTHER VARIABLES			
GRAGRDUM	0.153 (0.273)		
NOMEM	-0.139 (-0.598)		
CONSTANT	-2.992 (-1.031)	-1.906 (-2.009)**	-2.129 (-2.700)***
Number of obs.	102	102	102
Obs. with dependent = 0	68	68	68
% of correctly predicted	79	75	75
McFadden R^2	0.19	0.12	0.11

Table 6-3 Logit estimation results using ARREAR 2 as the dependent variable

	3-1	3-2	3-3
GROUP LEADER VARIABLES			
KNMEMDUM	-2.500	-1.193	-1.117
	(-2.817)***	(-1.916)*	(-1.869)*
AGE	-0.011		
	(-0.404)		
DIST	0.001		
	(0.844)		
AINSTAPA	1.096		
	(0.857)		
VFACCESS	0.650	0.735	0.695
	(1.502)*	(1.948)*	(1.894)*
VISTDUM	0.128		
	(0.233)		
LIVE	0.050		
	(2.161)		
EDUCATION	0.125		
	(0.351)		
OTHER GROUP MEMBERS			
AVKNMNGL	1.523		
	(1.579)		
AVDISTNGL	0.715		
	(0.141)		
AVAGENGL	0.015		
	(0.364)		
AVLIVNGL	0.003		
	(0.167)		
AVINSTNGL	1.260	1.752	1.663
	(1.005)	(1.868)*	(1.876)*
AVFACNGL	-0.243		
	(-0.643)		
AVISTNGL	-0.801	-0.738	
	(-1.286)	(-1.105)	
AVEDUNGL	0.382	0.420	
	(1.017)	(1.109)	
OTHER VARIABLES			
GRAGRDUM	0.212		
	(0.358)		
NOMEM	-0.302	-0.076	
	(-1.043)	(-0.388)	
CONSTANT	-3.062	-1.597	-1.681
	(-1.041)	(-0.953)	(-2.184)***
Number of obs.	102	102	102
Obs. With dependent = 0	74	74	74
% of correctly predicted	84	86	75
McFadden R^2	0.19	0.09	0.07

Table 6-4 Logit estimation results using ARREAR 3 *as the dependent variable*

	5-1	5-2	-3
GROUP LEADER VARIABLES			
KNMEMDUM	1.394		
	(1.051)		
AGE	0.085	0.066	0.049
	(2.796)***	(2.691)***	(2.635)***
DIST	0.001		
	(0.859)		
AINSTAPA	2.237	2.732	2.239
	(1.479)	(2.277)**	(2.167)**
VFACCESS	1.488	1.371	1.227
	(2.144)**	(2.066)**	(1.879)*
VISTDUM	0.124		
	(0.141)		
LIVE	-0.049	-0.024	
	(-1.912)*	(-1.291)	
EDUCATION	-0.271		
	(-0.517)		
OTHER GROUP MEMBERS			
AVKNMNGL	1.358		
	(1.168)		
AVDISTNGL	-0.001		
	(-0.412)		
AVLIVNGL	-0.010		
	(-0.483)		
AVINSTNGL	1.620		
	(0.928)		
AVFACNGL	0.624	0.368	
	(1.153)	(0.981)	
AVISTNGL	-0.164		
	(-0.147)		
AVEDUNGL	0.287		
	(0.619)		
OTHER VARIABLES			
GRAGRDUM	-1.045	-0.897	
	(-1.060)	(-0. 934)	
NOMEM	0.212		
	(0.688)		
CONSTANT	-11.862	-7.681	-6.893
	(-2.596)***	(-4.566)***	(-4.121)***
Number of obs.	102	102	102
Obs. with dependent = 0	89	89	89
% of correctly predicted	97	96	91
McFadden R^2	0.25	0.18	0.16

Table 6-4 presents the outcomes when using ARREAR 3 (repayment problems of group leaders) as the dependent variable. The results show that some of the variables have statistically significant coefficients, indicating that these variables do play a role in the mitigation of repayment problems. Yet, variables measuring peer monitoring and social ties are not among these. From the variables related to group leader AGE is statistically significant – indicating that the older the group leader, the more repayment problems he may face. The other group leader variables found to be statistically significant are AINSTAPA and VFACCESS. AINSTAPA indicates the monthly install payment of the group leader as a percentage of his income; this shows that the higher the monthly repayment burden of the group leader, the bigger his repayment problems. VFACCESS indicates that the more the group leader values future access of loans from the program, the smaller his repayment problems.

To summarize, tables 6-2 and 6-3 give similar results, showing that a few variables measuring characteristics of the group leader are significant in explaining arrears. In particular, the hypothesis that group leaders in the Eritrean lending programs play a role in compelling members to repay through social ties (KNMEMDUM) is confirmed.

VFACCESS, a variable measuring how much value a member attaches to future access of loans from the program, is found to be significant for the group leader but not for the other group members. This might indicate that group leaders actively monitor other group members and compel them to make their repayments on time. At the same time, the monitoring and social ties variables related to the other group members do not appear to be statistically significant. This may indicate that other group members are staying aloof from monitoring and social ties activities and leave the group leaders to do the job for them. Put differently, in case of the group leaders the monitoring and social ties variables really do measure peer monitoring activities and social ties, whereas in case of the other group members they do not. This may be true if group members free-ride on the efforts made by their group leader to reduce the chance of moral hazard. As is discussed in chapter 4, in the Eritrean programs a group leader has rather an important role to play as a representative of the group to the

program organization and he may generate all kinds of activities that may help improve repayment performance of the group he represents. This may leave little incentives for other group members to monitor group members, especially since these efforts may be costly and time consuming.

Alternatively, the results may indicate that monitoring by and social ties of group leaders are efficient in reducing moral hazard behavior, whereas monitoring by and social ties of other group members are not. Thus, for instance in the case of *KNMEMDUM*, if the group leader knows the other members, he/she really uses this knowledge to monitor and/or puts pressure on other members to repay their debts, which reduces the chance of repayment problems At the same time, if other group members know other members and this leads to monitoring and pressure, this does not reduce the probability of repayment problems. One explanation for this result could be that group members only feel pressured to behave prudently when the group leader monitors, perhaps because he/she may have more means to sanction moral hazard behavior by group members since he/she is the representative of the group to the program organization.

Alternatively, table 6-4, which is related to the dependent variable ARREAR 3, does give some significant variables (AGE, AINSTAPA and VFACCESS). Yet, these are all variables related to the group leader. Variables measuring monitoring by and social ties of the other members are not found to be significant.

6.5 Conclusions

This chapter has analyzed whether peer monitoring and social ties mitigate the incidence of repayment problems among group members in two group-based lending programs operating in Eritrea. By and large, the variables measuring regular group members' peer monitoring and social ties are found to be statistically insignificant, leading to the conclusion that there is no link between peer monitoring by and social ties of group members other than the group leader on the one hand and the occurrence

of repayment problems on the other hand. In contrast, variables related to the group leader are partially able to explain the repayment performance of groups and of group members other than the group leader. In particular, KNMEMDUM is statistically significant, showing that there is a link between group leaders' knowing other members before the formation of the group, and less probability of repayment problems from occurring.

The comparison between the two categories of variables (group leader versus non-group leader members variables) that is used to explain the incidence of repayment problems in this chapter, suggests that there is evidence – albeit weak – to support the hypothesis that there is a relationship between peer monitoring by and social ties of the group leader on the one hand, and the repayment performance of individual group members on the other hand. This may be due to the role group leaders play in the two Eritrean group-based lending programs. At the same time, theoretical models on group-based lending emphasize the point that peer screening, monitoring and enforcement activities taking place in groups is performed by all group members. The findings in the case of the Eritrean programs provide results that are in contrast with the existing theoretical models on group-based lending.

APPENDIX: Alternative empirical studies, summary statistics and correlation matrices

Table 6-A1Descriptive statistics of the variables used in the empirical analysis

	Mean	Median	Max	Min	Std. Dev.
DEPENDENT VARIABLES					
ARREAR 1	0.33				0.47
ARREAR 2	0.27				0.45
ARREAR 3	0.12				0.34
INDEPENDENT VARIABLES					
GROUP LEADER VARIABLES					
KNMEMDUM	0.84	1.00	1.00	0.00	0.36
AGE	45.00	44.50	75.00	22.00	11.75
DIST	630.10	325.00	5000	5.00	1056.00
AINSTAPA	0.38	0.33	1.21	0.06	0.23
VFACCESS	1.26	1.00	4.00	1.00	0.56
VISTDUM	0.71	1.00	1.00	0.00	0.46
LIVE	32.71	31.50	75.00	2.00	19.14
EDUCATION	2.19	2.00	4.00	1.00	0.87
OTHER GROUP MEMBERS					
AVKNMNGL	0.82	1.00	1.00	0.00	0.30
AVDISTNGL	373.67	227.50	2766.67	5.00	444.21
AVAGENGL	46.49	47.50	68.50	22.00	9.15
AVLIVNGL	33.00	34.75	67.00	3.50	16.70
AVINSTNGL	0.42	0.34	1.73	0.05	0.25
AVFACNGL	1.45	1.33	5.00	1.00	0.68
AVISTNGL	0.76	1.00	1.00	0.00	0.35
AVEDUNGL	1.82	2.00	3.00	1.00	0.61
OTHER VARIABLES					
GRAGRDUM	0.28	0.00	1.00	0.00	0.45
NOMEM	4.48	4.00	8.00	3.00	1.43

Source: own survey

Table 6-A2 Summary of empirical works on repayment performance of group-based lending programs

AUTHOR	DATA	MODEL	DEPEDENT VARIABLE	INDEPENDENT VARIABLES
Wenner (1995)	25 groups, FINCA, Costa Rica	1 Binomial probit 2 Multinomial logit 3 Tobit	1 Internal delinquency 2 External delinquency	Group characteristics 1 Informal screen = screening according reputation 2 Written code = group rules and regulations 3 Fvisits = whether a program officer visits a group 4 Infrastructure index = basic infra (0-5). 5 Organizational strength = a factor analysis score
Sharma and Zeller (1997)	128 groups BRAC, ASA, RDAS, Bangladesh	Tobit procedure	Percent unpaid at the due date (the due date is before the survey date)	1 Group characteristics 2 Community characteristics 3 Lender characteristics (Each variable is multiplied by loan size)
Matin (1997)	246 borrowers, Grameen Bank	Logit procedure	Dummy variable = 1, if the loan is not fully repaid by the due date	1 Dummy = 1 if he had any education 2 Dummy = 1 if he had used a loan for housing 3 Length of membership in years 4 Other source of loans 5 Other personal characteristics
Zeller (1998)	146 groups, six lending groups Madagascar	Tobit procedure	Percent repayment rate (no further description is given)	1 Community-based variables 2 Program level variables 3 Group level variables
Wydick (1999)	137 groups, ACCION-FUNDAP, Guatemala	Logit procedure	Group good repayment record (from the lending institution's records)	1 Social ties 2 Group pressure 3 Group monitoring 4 Control variables
Karlan (2001)	56 groups (30 per group) , FINCA, Peru	Tobit procedure	Default as a percentage of potential loan amount	1 Geographic proximity 2 Cultural similarities 3 Control variables
Paxton et al. (2000)	140 groups, PPPCR, Burkina Faso	Two-stage econometric model	Stage 1: repayment problems Stage 2: repayment of loan through group solidarity	1 Group homogeneity 2 Domino effect (within group and on region level) 3 Urban, a dummy variable = 1 for urban 4 Loan cycle 5 Other credits sources 6 Leadership and Training 8 Peer pressure
Van Tassel (2000)	40 individuals, Bancosol, Bolivia	Descriptive analysis		1 Screening variables 2 Group solidarity 3 Peer pressure and peer monitoring variables

Table 6-A3 Summary of empirical works done on repayment performance and findings

AUTHOR	DEPEDENT VARIABLE	INDEPENDENT VARIABLES	FINDINGS
Wenner (1995)	1 Internal delinquency 2 External delinquency	Group characteristics 1 Informal screen 2 Written code 3 Infrastructure index 4 Organizational strength 5 Fvisits 6 Group savings	Internal delinquency 1 Code → - ve significant 2 Fvisits → + ve significant External delinquency 1 Code → insignificant 2 Informal screen → + significant 3 Infrastructure → + ve significant
Sharma and Zeller (1997)	Percentage unpaid at the due date (the due date is before the survey date)	1 Group characteristics 2 Community characteristics 3 Lender characteristics (Each variable is multiplied by loan size)	1 Credit rationing → - ve significant $(\text{Rationing})^2$ → + ve significant 2 Relatives → + ve significant 3 Agriculture → - ve significant 4 Variance of land → - ve insignificant 5 Group initiation → - ve significant 6 Value of loan → + ve significant
Matin (1997)	Dummy variable = 1 if the loan is not fully repaid by the due date	1 Dummy = 1 if he had any education 2 Dummy = 1 if he had a loan used for housing 3 Length of membership in years 4 Other source of loans (NGOs) 5 Other personal characteristics	1 Education → - ve significant 2 Landholding → - ve significant $(\text{Landholding})^2$ → + ve significant 3 Loan for housing → + ve significant 4 Length of membership → + ve significant 5 Other credit sources → + ve significant
Zeller (1998)	Percentage repayment (no further description is given)	1 Community-based variables 2 Program level variables 3 Group level variables	1 Saving service → + significant 2 Initiated by members → insignificant 3 Group size → + ve significant 4 Cf. of variation of upland → + ve significant $(\text{var. of land})^2$ → - ve significant 5 Social ties → + ve significant 6 Internal rules → + ve significant 7 Degree of monetarization → + ve significant 8 Density of inputs retails → + ve significant

Wydick (1999)	Group's good repayment record (from the lending institution's records)	1 Social ties 2 Group pressure 3 Group monitoring 4 Control variables	1 Distance →- ve significant 2 Knowsales→+ve significant
Paxton et al. (2000)	Stage 1: repayment problems Stage 2: repayment of loan through group solidarity	1 Group homogeneity 2 Domino effect (within group and on region level) 3 Urban 4 Loan cycle 5 Group history 6 Leadership and training	Stage 1 1 Group homogen. → + ve significant 2 Domino effect → + ve significant 3 Urban dummy → - ve significant Stage 2 1 Domino effect → - ve significant 2 Loan cycle → - ve significant 3 Leadership → + ve significant 4 Training → + ve significant 5 Urban → + ve significant 6 Other credits so → + ve significant 7 Pressure → + ve significant
Karlan (2001)	Default as a percentage of potential loan amount	1 Geographic proximity 2 Cultural similarities 3 Control variables	1 Geo.concentration → - ve significant 2 Cultural similarity → - ve significant 3 Leadership + training → + ve significant

Table 6-A4 Correlation coefficients of relevant variables

	ARREAR 1	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
ARREAR 1	1.000000											
DIST	0.051043	1.000000										
AVDISTNGL	0.057413	0.000644	1.000000									
KNACTDUM	0.163188	0.005378	-0.125175	1.000000								
AVKNATNGL	0.025146	-0.087527	-0.028699	0.115818	1.000000							
KNSELDUM	0.178571	0.132101	-0.042433	0.066607	-0.266927	1.000000						
AVKNSLNGL	-0.041762	0.092272	-0.165989	0.100355	0.044754	0.078936	1.000000					
KNPURPDUM	0.100000	-0.019151	0.010240	-0.046625	0.214729	0.028571	0.043047	1.000000				
AVKNPNGL	-0.050490	0.047491	-0.083125	-0.088172	0.342136	0.074096	0.094717	0.240745	1.000000			
VISTDUM	-0.091287	0.051261	-0.063481	0.004256	0.057089	0.019562	0.136659	-0.091287	0.212018	1.000000		
AVISTNGL	-0.093385	-0.041315	0.040895	-0.071611	0.135895	-0.008231	0.124321	0.140872	0.315408	0.101331	1.000000	
BOGROUP	0.055728	0.128797	0.019672	0.098736	0.204659	-0.121407	-0.089334	0.013932	-0.068232	0.063590	-0.153190	1.000000

Table 6-A4 Continued…

	ARREAR 1	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVBOGRNGL	0.081313	0.028176	0.015434	0.145121	0.123718	-0.057542	-0.001118	-0.042110	-0.023173	-0.061005	-0.052184	0.301757
KNMEMDUM	-0.152499	0.043913	-0.057260	0.129763	0.074570	0.087142	0.093816	-0.060999		0.076566	-0.116352	0.421734
AVKNNGL	0.168078	0.026159	-0.072913	0.086643	0.349126	-0.017616	0.110503	0.072415	0.277060	0.035562	0.223472	0.121438
CHGRDUM	9.63E-18	-0.056270	-0.108803	-0.246148	-0.172518	0.115223	0.001413	0.043994	0.114092	0.200805	0.061626	-0.273773
AVCHGRNGL	-0.002647	0.017459	-0.030607	-0.077268	-0.085569	0.062779	-0.044206	0.064065	0.116566	0.103432	0.209562	-0.259060
LIVE	0.105529	0.013465	-0.036612	0.143911	0.133040	-0.004939	0.017182	0.031295	-0.101050	-0.045775	-0.154509	0.819027
AVLIVNGL	0.045097	-0.059718	-0.089794	0.087041	0.028742	-0.026943	0.018384	-0.068699	-0.067552	-0.023336	-0.091504	0.251312
PREDEDUM	-0.070360	-0.050182	-0.016585	0.032805	0.045079	-0.020103	-0.030288	0.014072	0.036493	0.064229	0.067243	-0.109788
AVPRDENGL	0.085522	-0.082377	-0.018263	0.101146	0.054624	0.039334	2.68E-05	0.043387	0.112517	-0.076040	-0.109448	0.106130
PREFLING	0.088388	-0.080696	0.019131	0.082423	-0.031310	-0.050508	-0.076098	0.035355	0.091689	-0.204407	-0.153492	0.059108
AVPRFNGL	0.113114	0.001827	0.084943	0.065925	0.046438	-0.040398	0.129091	-0.115942	-0.002791	0.085189	-0.043011	-0.059884
PREWDUM	0.130558	0.107343	0.170881	-0.036524	-0.190609	0.043519	0.139247	0.043519	-0.219929	0.018540	-0.026748	-0.133388

Table 6-A4 Continued

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENGL	PREFLING	AVPRFNGL	AVPRFNGL
AVBOGRNGL	1.000000											
KNMEMDUM	0.332256	1.000000										
AVKNNGL	0.110496	-0.006677	1.000000									
CHGRDUM	-0.189288	-0.055909	-0.012439	1.000000								
AVCHGRNGL	-0.198093	-0.175210	0.044803	0.426653	1.000000							
LIVE	0.245139	0.413841	0.002394	-0.265699	-0.289002	1.000000						
AVLIVNGL	0.860061	0.291951	0.113742	-0.086454	-0.179455	0.274517	1.000000					
PREDEDUM	-0.009017	0.042919	0.061782	-0.030954	-0.045076	-0.134316	-0.038960	1.000000				
AVPRDENGL	-0.031011	0.078252	0.013968	-0.095438	-0.058246	0.076737	-0.045346	-0.030527	1.000000			
PREFLING	-0.009710	0.107833	-0.014717	-0.077771	-0.113251	0.027790	-0.071984	-0.024876	0.767470	1.000000		
AVPRFNGL	-0.069378	-0.078702	0.119625	0.043543	0.119405	-0.187522	-0.012513	-0.121370	-0.009202	-0.134973	1.000000	
PREWDUM	-0.066930	-0.092913	-0.014629	0.012764	0.099541	-0.113325	-0.059789	0.073488	-0.230212	-0.164122	0.063995	1.000000

Table 6-A4 Continued

	ARREAR1	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVPRWNGL	0.085522	-0.08237	-0.018263	0.101146	0.054624	0.039334	2.68E-05	0.043387	0.112517	-0.076040	-0.109448	0.106130
AGE	0.082992	-0.19455	0.002333	0.108236	-0.001720	0.102978	0.066771	-0.035805	-0.041372	-0.117429	-0.030552	0.124345
AVAGENGL	-0.093228	-0.19010	-0.101193	0.013833	-0.055031	0.013122	-0.000107	-0.079088	-0.252653	-0.142410	-0.126350	0.071847
GENDUM	0.041667	-0.10170	-0.026053	0.151532	0.124274	-0.011905	-0.058896	-0.133333	-0.041788	-0.134395	-0.033833	0.211301
AVGENGL	-0.017716	-0.07601	-0.081302	0.036471	0.011788	-0.014406	-0.089579	-0.128917	-0.139731	-0.186603	-0.118442	0.204060
EDUCATION	-0.112378	0.082904	0.116269	-0.230545	-0.111088	0.071096	-0.048067	0.195859	0.045687	0.071811	0.108963	-0.136435
AVEDUNGL	0.014969	0.127513	0.062808	-0.087604	-0.163934	-0.022521	-0.107196	0.035092	0.094976	-0.049193	0.023312	-0.141845
MOSLDUM	0.111350	-0.03378	0.042511	0.117184	0.105324	-0.002272	-0.178038	-0.241788	-0.102000	-0.066797	-0.174276	0.304059
AVMOSLNGL	0.033957	-0.06326	0.012491	0.060924	0.145276	-0.013583	-0.162889	-0.184455	-0.094419	-0.095723	-0.030359	0.192187
MARDDUM	0.087304	-0.05360	-0.119308	0.086296	0.043029	-0.027438	0.070228	-0.069843	-0.085074	-0.047818	0.009506	-0.050599
AVMARNGL	0.092088	-0.03908	0.110448	0.044100	-0.001281	0.046752	-0.028742	-0.014015	-0.096765	-0.096993	-0.045210	0.109344
INCOME	-0.021710	0.019151	0.192834	-0.207505	-0.075717	0.074433	0.154235	0.040163	0.127025	0.042939	0.066770	-0.125671

Table 6-A4 Continued

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENGL	PREFLING	AVPRFNGL	AVPRFNGL
AVPRWNGL	-0.031011	0.078252	0.013968	-0.095438	-0.058246	0.076737	-0.045346	-0.030527	1.000000	0.767470	-0.009202	-0.230212
AGE	0.016628	0.128234	-0.081596	-0.138483	-0.169753	0.576199	0.104165	-0.149236	-0.002710	-0.007964	-0.271687	-0.048398
AVAGENGL	0.120468	0.041520	0.018130	-0.081671	-0.163030	0.167345	0.494789	-0.125602	0.120049	0.001745	0.020877	-0.047783
GENDUM	0.098410	0.133436	0.085545	-0.260706	-0.375475	0.437521	0.162129	-0.105540	0.068603	0.068746	-0.292212	-0.161989
AVGENGL	0.261131	0.131445	0.149081	-0.158077	-0.250881	0.305970	0.469597	-0.104896	0.096034	-0.001445	-0.083047	-0.104616
EDUCATION	-0.219860	-0.058145	-0.066097	0.129485	-0.024820	-0.304085	-0.280454	0.092624	0.074944	-0.008514	-0.091705	-0.022357
AVEDUNGL	-0.126470	-0.086760	-0.159074	0.031455	0.197651	-0.114761	-0.141758	0.029704	-0.136169	-0.052924	0.025806	0.044199
MOSLDUM	0.174162	0.128568	0.235730	-0.181953	-0.196237	0.324017	0.181725	-0.058199	-0.044064	-0.050616	0.066575	-0.085841
AVMOSLNGL	0.206981	0.050127	0.240767	-0.163135	-0.120682	0.187742	0.214654	-0.065178	-0.170131	-0.131101	0.039447	-0.046816
MARDDUM	0.121481	-0.009320	-0.081433	-0.107544	-0.266619	0.032811	0.099733	0.049141	0.077214	0.123466	-0.102703	-0.003040
AVMARNGL	0.199092	0.034297	0.069350	-0.161247	-0.268162	0.118738	0.256278	-0.253442	0.111117	0.042416	0.109239	-0.060162
INCOME	-0.308244	-0.116702	-0.024255	0.227366	0.088248	-0.099643	-0.263672	-0.028258	0.091988	-0.060125	-0.020259	0.083929

Table 6-A4 Continued

	AVPRWNGL	AGE	AVAGENGL	GENDUM	AVGENGL	EDUCATION	AVEDUNGL	MOSLDUM	AVMOSLNGL	MARDDUM	AVMARNGL	INCOME
AVPRWNGL	1.000000											
AGE	-0.002710	1.000000										
AVAGENGL	0.120049	0.168148	1.000000									
GENDUM	0.068603	0.624613	0.240412	1.000000								
AVGENGL	0.096034	0.266818	0.648867	0.549871	1.000000							
EDUCATION	0.074944	-0.381282	-0.084278	-0.263554	-0.154544	1.000000						
AVEDUNGL	-0.136169	-0.010319	-0.168470	-0.163871	-0.131212	0.082668	1.000000					
MOSLDUM	-0.044064	0.203871	0.248024	0.461306	0.506646	-0.393275	-0.255814	1.000000				
AVMOSLNGL	-0.170131	0.077058	0.179129	0.340476	0.426431	-0.337773	-0.424005	0.754062	1.000000			
MARDDUM	0.077214	0.119903	0.082020	0.474351	0.234235	-0.030835	-0.085333	0.175538	0.120291	1.000000		
AVMARNGL	0.111117	0.045565	0.265374	0.323410	0.468594	-0.050795	-0.237034	0.200832	0.303815	0.145777	1.000000	
INCOME	0.091988	-0.038473	-0.036092	-0.155134	-0.097201	0.365083	0.256108	-0.204267	-0.300319	-0.169064	-0.150183	1.000000

Table 6-A4 Continued

	ARREAR1	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVINCNGL	-0.098175	-0.086588	-0.007466	0.019752	-0.035535	0.071758	-0.072152	0.013430	0.035666	0.013516	0.009961	-0.008584
SAMESEX	0.014039	-0.066077	0.198071	-0.147929	-0.050160	-0.032088	-0.034546	-0.120732	-0.148786	0.015379	-0.050571	-0.095446
VFACCESS	0.223297	-0.038118	0.106830	-0.138817	0.170325	0.175448	0.302957	0.066989	0.127262	-0.156278	-0.028518	0.006222
AVFACNGL	-0.028345	-0.107956	-0.140965	-0.042436	-0.018858	-0.073625	0.125778	-0.062360	0.004706	0.035285	0.023641	0.134987
ACORDUM	-0.181115	0.133885	-0.069454	-0.164994	0.029946	0.121407	0.281070	0.128174	0.299787	0.368824	0.330130	-0.208075
OTHCREIT	0.088388	-0.084461	-0.022407	0.082423	-0.182451	0.164150	0.155603	0.035355	-0.080735	0.069929	0.009718	-0.024628
AVOTHNGL	0.104044	-0.043791	0.079419	-0.152130	0.080192	0.311537	-0.054281	0.036623	0.056008	-0.207433	-0.198920	0.009973
VALOAN	0.078804	-0.143740	0.118789	0.005235	-0.066025	0.113193	-0.137904	0.140983	-0.219131	-0.200834	-0.042441	-0.170308
AVLAONGL	0.038292	-0.196377	0.098539	-0.043134	0.164956	0.054919	-0.102568	0.130547	0.150477	-0.044695	0.076836	-0.014525
NOMEM	0.053730	-0.137123	-0.125007	0.204512	0.075993	-0.103970	-0.199062	-0.051776	-0.092538	-0.296964	-0.228603	0.140184
GRAGRDUM	-0.076841	-0.061080	-0.030622	-0.011465	0.088448	0.096600	0.100222	0.089136	0.024301	0.168351	0.046994	0.003426
AINSTAPA	0.184339	-0.113729	0.120967	0.124746	0.091949	-0.088998	-0.223055	0.025073	-0.347954	-0.225479	-0.229987	0.117193
AVINSTGL	0.205409	-0.055682	0.140405	0.102289	0.182399	-0.105155	-0.209985	0.061435	-0.230440	-0.077246	-0.172786	0.225326

Table 6-A4 Continued

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENGL	PREFLING	AVPRFNGL	AVPRFNGL
AVINCNGL	-0.252607	-0.027385	-0.300280	0.009461	0.010820	0.112987	-0.206345	-0.051254	-0.022579	-0.017539	-0.087099	-0.092128
SAMESEX	0.088933	0.068508	-0.130814	0.125582	0.083471	-0.136756	0.085934	0.084947	-0.126387	-0.039707	0.312434	0.117303
VFACCESS	0.066094	0.059592	0.178829	-0.085503	-0.060493	0.077979	0.034886	-0.047133	0.013042	0.030702	-0.076827	-0.017276
AVFACNGL	-0.042669	0.131133	0.004750	0.141456	0.084248	0.138061	-0.119663	0.080863	0.342814	0.230011	-0.041900	-0.140613
ACORDUM	-0.288748	-0.042492	-0.118090	0.273773	0.236488	-0.231586	-0.227645	0.109788	0.028247	-0.142845	0.100070	-0.072757
OTHCREIT	-0.006473	-0.006740	-0.104410	0.069130	-0.049606	0.029977	0.041231	-0.024876	-0.076698	-0.062500	0.119976	0.097447
AVOTHNGL	0.058824	0.111700	-0.045919	-0.080561	0.055748	0.043719	0.064014	-0.025768	-0.005660	0.035314	-0.159821	-0.030428
VALOAN	-0.010060	-0.124125	-0.065951	0.055882	0.092906	-0.185703	-0.055755	0.024761	0.004377	-0.035113	-0.023414	0.106925
AVLAONGL	0.003400	-0.061521	-0.013196	-0.063095	-0.039196	-0.029018	0.011299	-0.056182	-0.043229	-0.068464	-0.017580	0.034086
NOMEM	0.180201	-0.024953	0.156945	-0.178358	-0.166522	0.208106	0.210683	-0.033680	0.089456	0.150243	-0.004282	-0.039113
GRAGRDUM	0.027293	0.152336	0.065084	0.187058	0.004963	-0.072735	0.089023	-0.062716	0.057317	-0.065202	0.073446	-0.034779
AINSTAPA	0.167763	0.036662	0.022527	-0.174952	-0.186715	0.060896	0.016196	0.048837	-0.102319	0.040073	-0.112942	0.171566
AVINSTGL	0.251998	0.095460	-0.004385	-0.175413	-0.159704	0.128003	0.120474	0.002739	-0.054297	0.060876	-0.201865	0.173922

Table 6-A4 Continued

	AVPRWNGL	AGE	AVAGENGL	GENDUM	AVGENGL	EDUCATION	AVEDUNGL	MOSLDUM	AVMOSLNGL	MARDDUM	AVMARNGL	INCOME
AVINCNGL	-0.022579	0.221959	0.036083	0.087551	0.021490	0.089775	0.218047	-0.046902	-0.108845	0.021525	-0.007536	0.161940
SAMESEX	-0.126387	-0.103244	0.053404	-0.248016	-0.044499	-0.219968	-0.059490	0.134882	0.181875	0.028435	-0.095110	-0.050288
VFACCESS	0.013042	0.081673	-0.120472	0.059959	-0.023431	-0.127858	-0.094522	0.004736	-0.042159	0.101372	0.094295	0.048612
AVFACNGL	0.342814	0.037014	-0.040185	0.017465	-0.100608	0.170721	-0.012634	-0.054271	-0.250726	0.055145	-0.019115	0.131758
ACORDUM	0.028247	-0.132769	-0.079457	-0.250775	-0.335746	0.341759	0.152077	-0.530109	-0.555065	0.000973	-0.228215	0.241361
OTHCREIT	-0.076698	-0.000838	0.078024	-0.098209	0.047699	0.087977	0.108795	-0.050616	-0.163757	-0.086426	0.024775	0.179096
AVOTHNGL	-0.005660	0.045937	-0.004190	0.067282	0.079877	-0.106500	0.030654	0.064613	0.070231	0.083422	-0.005485	-0.007499
VALOAN	0.004377	-0.136434	-0.071944	-0.185674	-0.027571	0.203216	0.074182	-0.075144	-0.009293	-0.076753	0.096209	0.255132
AVLAONGL	-0.043229	-0.024803	0.030531	-0.077968	0.010661	0.183190	0.005437	0.046093	0.037324	-0.092423	-0.136163	0.018420
NOMEM	0.089456	0.152149	0.242237	0.277603	0.352003	-0.228818	-0.280916	0.451894	0.571406	0.045373	0.211946	-0.248454
GRAGRDUM	0.057317	-0.153581	0.085700	-0.058912	-0.015037	0.335049	-0.120755	-0.019557	-0.067925	-0.071915	-0.087068	0.127283
AINSTAPA	-0.102319	-0.033480	-0.121087	0.075820	0.072588	-0.084735	-0.037279	0.293666	0.263900	0.082517	0.057203	-0.280440
AVINSTGL	-0.054297	-0.070907	-0.058873	-0.001714	0.022408	0.058647	-0.163282	0.141894	0.184567	0.025576	0.055377	-0.210993

Table 6-A4 Continued

	AVINCNGL	SAMESEX	VFACCESS	AVFACNGL	ACORDUM	OTHCREIT	AVOTHNGL	VALOAN	AVLAONGL	NOMEM	GRAGRDUM	AINSTAPA	AVINSTGL
AVINCNGL	1.000000												
SAMESEX	-0.080992	1.000000											
VFACCESS	-0.039465	0.013584	1.000000										
AVFACNGL	-0.079185	-0.100930	-0.006764	1.000000									
ACORDUM	0.065228	-0.104052	0.099551	0.206788	1.000000								
OTHCREIT	0.410398	-0.124085	-0.043860	-0.013666	0.024628	1.000000							
AVOTHNGL	0.047725	-0.041131	0.425003	-0.033116	-0.021801	-0.064742	1.000000						
VALOAN	0.109309	0.105992	-0.182635	-0.038264	-0.259222	0.191976	-0.060201	1.000000					
AVLAONGL	0.207582	0.097310	-0.110801	-0.213280	-0.221676	0.053022	-0.039845	0.257569	1.000000				
NOMEM	-0.016401	0.051155	-0.086165	-0.078415	-0.667713	-0.143335	-0.071067	0.130481	0.146148	1.000000			
GRAGRDUM	-0.006710	-0.078101	0.012583	0.022098	0.171288	0.211906	-0.006652	0.126383	0.101147	0.031678	1.000000		
AINSTAPA	-0.061770	0.137580	-0.167763	-0.100129	-0.588878	0.142792	-0.022975	0.480918	0.140290	0.239591	-0.016549	1.000000	
AVINSTGL	-0.214373	0.073631	-0.115735	-0.143235	-0.538823	-0.046696	-0.070401	0.322511	0.390458	0.255912	-0.096113	0.567619	1.000000

Table 6-A5 List of variables with their expected signs

INDEPENDENT VARIABLES	EXPECTED SIGNS
GROUP LEADER VARIABLES	
KNMEMDUM	-
AGE	+/-
DIST	+
AINSTAPA	+
VFACCESS	-
VISTDUM	-
LIVE	-
EDUCATION	+/-
OTHER GROUP MEMBERS	
AVKNMNGL	-
AVDISTNGL	+
AVAGENGL	+/-
AVLIVNGL	-
AVINSTNGL	+
AVFACNGL	-
AVISTNGL	-
AVEDUNGL	+/-
OTHER VARIABLES	
GRAGRDUM	-
NOMEM	+/-

Chapter 7 Peer Monitoring, Social Ties and Moral Hazard in Group-Based Lending Programs[1]

7.1 Introduction

As mentioned in chapter 2 the group-based lending mechanism creates incentives for individual group members to screen and monitor each other and to enforce repayment. One of the expected outcomes of group-based lending mechanism is that it reduces moral hazard behavior of the participants.

While this outcome can be shown in theoretical models (see e.g. Stiglitz, 1990; Varian, 1990), there is surprisingly little empirical evidence on this issue. This is partly due to the fact that it is difficult to obtain reliable data on the behavior of participants in group-based lending programs. In this chapter, we provide an empirical analysis of the impact of peer monitoring and social ties within group-based lending programs on the moral hazard behavior of its participants, based on data from the two Eritrean MFIs. It is important to know whether group-based lending programs help to mitigate moral hazard behavior, since this may contribute to higher repayment rates, which in turn may improve the sustainability of such programs.

A distinguishing feature of the data we collected from Eritrean programs is that we have information on more than one group member from each group.[2] This allows us to split our data into two – information related to the group leader and information related other members of the group – and we test this empirically.

The remainder of the chapter is organized as follows. Section 7.2 provides a review of the literature on group-based lending programs and the related

[1] This chapter is based on Hermes, Lensink and Mehrteab (2003) and Hermes, Lensink and Mehrteab (2005).

[2] We have data on at least two members from each group. Most empirical studies on microfinance programs use data of one individual as a representative of a group.

incentive effects on the behavior of group participants, emphasizing moral hazard behavior. Section 7.3 presents the empirical model we use to investigate moral hazard behavior in the group-based lending programs in Eritrea. Section 7.4 discusses the outcomes of the empirical analysis. Section 7.5 concludes.

7.2 Group-based lending and moral hazard behavior: a literature review

Stiglitz (1990) and Varian (1990) are the seminal publications in this area. They present models in which peer monitoring within groups reduces moral hazard behavior of individual group members. Group-based lending programs delegate costly monitoring activities to group members, reducing the costs of lending, which can be translated into lower interest rates for the borrowers (Varian, 1990) and/or larger loan contracts (Stiglitz, 1990). Banerjee et al. (1994) discuss the credit cooperatives that were common in the late nineteenth and early twentieth century in Western Europe. They show that these credit cooperatives created incentive structures similar to group-based lending, leading to monitoring among borrowers, which helped to reduce moral hazard behavior.

7.2.1 The basic model

We continue with this literature review by presenting a theoretical model, which we adopted from Ghatak and Guinnane (1999). This model shows how the joint liability lending mechanism can be useful in mitigating moral hazard. As mentioned in chapter 2, when there is a moral hazard problem the principal cannot observe the agent's behavior (actions or decisions) perfectly without incurring additional costs. The actions taken by the agent are based on his own interest and are not necessarily for the best interest of the principal. However, introducing the joint liability lending to the model changes the behavior of the agent to the advantage of the principal.

In this subsection we first present the standard individual liability argument. Subsequently, we focus on the joint liability model. We are

going to use the following assumptions: output R takes two values, high (R^h) and low (R^L), where $R^h > R^L \geq 0$. For simplicity, we normalize R^L to be equal to zero. Borrowers are risk-neutral. Output is high with probability $p \in (0,1)$. Each project requires 1 unit of capital. The repayment for the lender, i.e. principal, plus interest equals $\rho > 1$ on average. Borrowers will be interested in borrowing only if their payoff exceeds the opportunity cost of labor, $\bar{u}$. The project returns of different borrowers are assumed to be uncorrelated. It is assumed that all projects are socially profitable in the sense that the expected return from the project is greater than the opportunity costs of the capital and labor employed in the project, i.e.

$$pR^h > \rho + \bar{u}. \tag{1}$$

It is assumed further that there is a limited liability, which means that the borrower cannot have negative liabilities. A standard loan contract specifies an interest rate r, which is the amount of money the borrower has to pay to the bank. The following model is for the individual liability case. Borrowers incur a dis-utility cost of effort $\frac{1}{2}\psi p^2$ (where ψ > 0). Notice that social surplus $pR^h - \frac{1}{2}\psi p^2$ is maximized if $p = p^* = \frac{R^h}{\psi}$. Let us assume that

$$R^h < \psi \tag{2}$$

Thus, we have an interior solution. Because of imperfect information, the bank cannot specify which p the borrower would choose, as the choice of p is subject to moral hazard. The borrower chooses p, assuming r is given, in order to maximize his private profit:

$$\hat{p}(r) \equiv \arg\max\left\{ p(R^h - r) - \frac{1}{2}\psi p^2 \right\} = \frac{R^h - r}{\psi}. \tag{3}$$

Substituting $p = \frac{(R^h - r)}{\psi}$ in the bank's zero profit condition $pr = \rho$, we get[3] $\psi p^2 - R^h p + \rho = 0.$ This is a quadratic equation in p and it means that it can give us two equilibrium values of p. Let us choose the equilibrium with the highest p, i.e.

$$p = \frac{R^h + \sqrt{(R^h)^2 - 4\rho\psi}}{2\psi}. \tag{4}$$

In case of joint liability, it is assumed that if a borrower is willing and able to pay his/her own loan but his/her partner is unwilling or unable to repay this loan, the former must pay an additional amount c to the bank. This payment of c for an unable or unwilling partner can be perceived as net present discounted value of the cost of sacrificing present consumption in order to pay for a partner. Although it is possible that groups have got more than two members, for the sake of simplicity we assume that groups are composed of only two borrowers who have organized themselves into a borrowing group to acquire a loan from a program. In case a borrower's project fails, his fellow group member is liable to pay for him (joint liability). If one member chooses an action p^l, then the payoff function of a borrower who chooses an action p is

$$Max \quad pR^h - rp - cp(1 - p^l) - \frac{1}{2}\psi p^2. \tag{5}$$

Assume that the borrower chooses action p to maximize his individual payoff, taking his group member's action p^l as given. Then his best response function is given by:

$$p = \frac{R^h - r - c}{\psi} + \frac{c}{\psi} p^l. \tag{6}$$

This means that the safer the partner's project, the safer the project choice of a borrower. On the other hand, if the partner chooses a risky project,

[3] In order to get the above result we first have arranged it as follows: $p\psi = R^h - r$ and solve for r, $r = R^h - p\psi$, and then substitute the last equation in $pr = \rho$.

the borrower also chooses a riskier project. This is because if he chooses a safe project while his partner chooses a risky project, the probability of ending up paying for his partner increases. Thus, if the two partners decide on their project non-cooperatively, in the symmetric Nash equilibrium the first-order condition becomes

$$p = p^l = \frac{(R^h - r - c)}{(\psi - c)}.^4 \tag{7}$$

The bank's zero-profit condition under joint liability lending is:

$$\rho = rp + cp(1-p). \tag{8}$$

$$r = -p\psi - pc + R^h - c \tag{9}$$

Substituting the first order condition in the bank's zero-profit condition gives,

$$\psi p^2 - R^h p + \rho = 0. \tag{10}$$

This is a quadratic equation in p which means there are two values of p consistent with equilibrium. We assume that the equilibrium with the higher value of p is chosen, i.e.

$$p = \frac{R^h + \sqrt{(R^h)^2 - 4\psi\rho}}{2\psi}. \tag{11}$$

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[4] Symmetry means $p = \frac{R^h - r - c}{\psi} + \frac{c}{\psi} p^l$.

$$p - \frac{c}{\psi} p^{i} = \frac{R^h - r - c}{\psi}$$

$$\frac{p\psi - cp}{\psi} = \frac{R^h - r - c}{\psi}$$

Accordingly, we see no difference in the equilibrium project choice between the standard individual liability case indicated in equation 4 and join liability lending (without cooperation between the two partners). Consequently, joint liability does not alleviate moral hazard in this model. This is because the two partners do not take into consideration the effect of the action that they have taken on the basis of their partner's choice.

If instead borrowers decide on project choice cooperatively they will choose:

$$\bar{p} \equiv \max pR^h - rp - cp(1-p) - \frac{1}{2}\psi p^2 = \frac{R^h - r - c}{\psi - 2c}. \tag{12}$$

Substituting this expression in the bank's zero-profit condition, we get:

$$(\psi - c)p^2 - R^h p + \rho = 0. \tag{13}$$

This is another a quadratic equation in p. Again, we have two values of p consistent with equilibrium. In line with the analysis, we assume that the equilibrium with the higher value of p is chosen, i.e.

$$p = \frac{R^h + \sqrt{(R^h)^2 - 4\rho(\psi - c)}}{2(\psi - c)}. \tag{14}$$

At the beginning we assumed that $R^h < \psi$, and it is also clear that $c < \psi$, as the borrower cannot pay more than what his project yields.

For $c \in (0, \psi)$, if we compare the two equilibrium values of p, we see that the value of the numerator of the expression under joint liability is higher than the corresponding expression under individual liability,[5] while the denominator of the former expression is lower than of the later. Therefore, the equilibrium value of p and, hence, the repayment rate, is higher under

[5] We get the same result when the two group partners acted non-cooperatively.

group-based lending with joint liability when borrowers choose p cooperatively than individual-liability lending.

7.2.2 Extensions of the basic model

Other models elaborate on the models by Stiglitz and Varian, dealing with extensions such as the efficient organization of monitoring within groups (Armendáriz De Aghion, 1999), and the importance of repeated loan contracts in order to obtain the benefits from peer monitoring and to prevent free-rider problems from occurring within groups (Che, 2001). Some other models relax the assumption of costless peer monitoring implicit in the models by Stiglitz and Varian (Conning, 2000; Madajewicz, 1999). Conning (1996) presents a model that shows that group-based lending will only be used if group members have a substantial monitoring and enforcement advantage compared to outsiders, and if the project returns across borrowers are not highly correlated. The model also discusses the effects of collusion among borrowers on group-based lending efficiency and provides a cost-benefit analysis of group-based lending.

Some papers focus on the role of social ties in reducing moral hazard behavior by individual members. The importance of social ties is explained in terms of the consequences of non-repayment of a certain for his or her position within an existing social network, since non-repayment will have a negative impact on the other group members' current wealth and their future access to loans. Strong social ties may increase peer monitoring and peer pressure. It is believed that due to these ties members are better able to monitor and may more easily pressurize others into repaying (Floro and Yotopoulos, 1991). Others, however, have indicated that social networks may be counterproductive. Since people know each other very well and have close social ties, they may be less eager to pressurize others for repayment (Wydick, 1999). For instance, family or friends may be less eager to use pressure for fear of losing family or friends, which in such cases are valued higher than the loss of money (Conning, 2000).

Finally, some papers stress the importance of using peer pressure to enforce repayment within groups and to reduce moral hazard (Besley and Coate, 1995). An allied argument holds that once there are sufficiently strong and credible threats of the use of social pressure, this may stimulate individuals into not pursueing moral hazard behavior (Wydick, 1996).

Wydick (2001) presents a model that combines several of the abovementioned issues related to the working of group-based lending. In this model groups are created on the basis of self-selection albeit (in contrast with other models) under imperfect information. Next, monitoring takes place, and members help those who have been confronted with adverse external shocks and exclude those who have misused the money they received by using social sanctions. In the Wydick model borrowing groups are described as dynamic peer review committees.

While the theoretical literature on monitoring and moral hazard within group-based lending programs is quite extensive, there are only very few empirical studies of these phenomena. A possible explanation for this is that it is difficult to obtain reliable data on monitoring and moral hazard behavior of participants in group-based lending programs. As far as we know Wydick (1999) is the only substantial empirical study available on this issue. He uses information from group-based lending programs in Guatemala. Wydick analyzes the role of peer monitoring, peer pressure and social ties in reducing moral hazard behavior of individual group members. His findings show that while peer monitoring and (to a lesser extent) peer pressure help to reduce moral hazard and increase the repayment performance of groups, social ties do not have the same effect.[6]

[6] Several other studies have looked at monitoring and moral hazard, but in general they lack rigorous econometric analyses. Mondal and Tune (1993) use information from the Good Faith Fund in the United States. They describe that weak social ties lead to adverse repayment performance, since group borrowers are not willing to support other group members in case of default. Van Tassel (2000) provides a descriptive analysis of the group-based lending program run by the BancoSol in La Paz, Bolivia. The questionnaire he used for his research contained a question concerning whether individual group members gave business advice to fellow group members. 75 per cent of the interviewees responded to this question affirmatively. Van

7.3 The empirical model

As mentioned in the literature review, monitoring and social ties may influence moral hazard within groups. In the empirical analysis we investigate whether peer monitoring and social ties play a role in mitigating moral hazard problems in the two Eritrean group-based lending programs we studied.

In order to investigate this, we need a measure of moral hazard behavior within groups. Following the empirical work by Wydick (1999) we included a question on misuse of borrowed money by group members. In order to get a clear picture of such instances, we decided to pose this question to just one person in the group in order to avoid conflicting information on this issue. We decided that the best person to ask this question was the group leader, since he was responsible for reporting to the program staff on the performance and sustainability of the group. Also, he has several other responsibilities within the group that make him the most reliable source of information about loan abuses. Since there were 102 group leaders in our sample, we got the same number of observations on the instances of misuse of borrowed money.

The dependent variable in the analysis is ABUSES, a dummy variable that may be 0 or 1, and that measures the occurrence of moral hazard behavior within a group. In particular, ABUSES = 1 if the group leader indicates that at least one member at one time misused a loan. By misuse we mean that a member used the loan for other purposes than he said he would when applying for the loan; such a misuse increases the probability of repayment problems. Note, however, that misuse is not the same as non-repayment at group level, since peer monitoring and peer pressure within the group may prevent the misuse of a loan from leading to non-repayment by the group.

We use a logit model to estimate the relationship between variables that measure social ties and peer monitoring within groups, and moral hazard

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Tassel argues that this is indicative evidence for the fact that monitoring takes place within groups.

behavior of group members. In our data set we have information on these variables. This information allows us to distinguish between group leaders and other group members with respect to their opportunities for monitoring and the social ties they may have with other members.

From the survey we were able to use a number of (dummy) variables to measure whether monitoring takes place within groups. In particular, we used the following variables to measure monitoring.

- KNACTDUM = 1, if the group member knows about the activities of other group members;
- KNSELDUM = 1, if the group member knows the monthly sales of the other group members;
- DIST = average distance (in meters) between the group member and the other members of the group;
- VISTDUM = 1, if the group member regularly visits the other members.

These four variables hold information about the extent to which group members (group leaders or other members) have information about each other, giving them the opportunity to monitor each other. For KNACTDUM, KNSELDUM and VISTDUM we expect a negative sign of the coefficient: if these dummies are equal to 1, the probability of moral hazard occurring in a group falls; if group members know about each others sales and activities and if they visit each other regularly, they will also be better equipped to monitor each others behavior. For DIST we expect a positive sign of the coefficient: if the distance between group members increases monitoring becomes more difficult and thus the probability of moral hazard increases.

Next, we have a number of dummy variables to measure the existence of social ties. In particular, we have used the following variables:

- BOGROUP = 1, if the group member was born in the same area where the survey was held;

- KNMEMDUM = 1, if the group member knew the other group members before the group was formed;
- CHGRDUM = 1, if the group member has ever been a member of another group.

All three variables contain information about the extent to which individuals within a group are related to each other. Such relations may influence the use of peer monitoring and/or peer pressure within the group. For BOGROUP and KNMEMDUM we expect a negative sign of the coefficient: if these dummies are equal to 1, this means that group members know each other, which is assumed to indicate that there are social ties, decreasing the probability of moral hazard within a group. For CHGRDUM we expect the coefficient to have a positive sign: if this dummy is equal to 1, the likelihood of moral hazard within a group increases. If a group contains one or more people who have been a member of another group, this indicates that the members of this group do not have long-standing relationships – which is assumed to reduce social ties and the knowledge the member(s) will have of their fellow members.

In addition to these variables that measure social ties and peer monitoring within groups, we also used a set of variables that measure the personal characteristics of group members, as well as a set of other variables. The latter two sets of variables are used in the empirical analysis as control variables. In particular, we have used the following variables to measure personal characteristics (again, we have separate information on these variables for group leaders and regular members):

- AGE = age of the group member (in years);
- GENDUM = 1, if the group member is male;
- EDUCATION – ranging from 1 (= illiterate) to 4 (= secondary education);
- MOSLDUM = 1, if the group member is Muslim;
- MARDUM = 1, if the group member is married;
- INCOME = monthly income of the group member (in Nakfas).

The reason why we include these variables in our analysis is that personal characteristics may influence moral hazard behavior in groups. We have no explicit expectations on the signs of each of the variables, however.

Finally, we use the following set of other control variables:

- PROVISIT = 1, if a representative of the credit program visits the group regularly;
- GRAGRDUM = 1, if the group members use rules on how to behave within the group;
- VFACCESS indicates the value a group member attaches to future access to loans by the credit program, ranging from 1 (= very high) to 4 (= very low);
- SAMESEX = 1, if all group members are of the same sex;
- LEADERRESP = 1, if the other members agree that their group leader takes great responsibility;
- ACORDUM = 1, if a group is in the SZSCS program.

The variables PROVISIT, GRAGRDUM, SAMESEX and ACORDUM refer to the group as a whole (i.e. including the group leader and regular members). For PROVISIT the expected sign is unclear: it may be positive if the representative needs to visit a group regularly because there are repayment problems; it may be negative if the visiting acts as a monitoring device and is supposed to reduce the chance of moral hazard behavior. For GRAGRDUM we expect to find a negative sign: if a group uses rules on how to behave, this will reduce the risk of moral hazard behavior. For VFACCESS we also expect to find a negative sign: if group members highly value future access to loans by the program, this will encourage them to behave correctly, thus reducing the likelihood of moral hazard behavior. The LEADERRESP variable refers to the other group members only. We have no explicit expectations on the sign of this variable and neither on the sign of the SAMESEX variable[7]. The ACORDUM variable is included to take into account the possibility that moral hazard behavior differs between groups in the SMCP and the

SZSCS program due to differences in institutional rules and the operation of these programs.[8]

7.4 Empirical results

As indicated above, the empirical analysis focuses on testing whether peer monitoring and the existence of social ties in groups do actually reduce misuse of loans by group members. The analysis is carried out as follows. We start by estimating the entire model, which includes all of our measures of peer monitoring, social ties, individual characteristics and other variables as discussed in section 7.5. Next, we delete variables from the model for which we do not find significant coefficients until we find the best fitting model, i.e. the model that includes only significant coefficients. Thus, we are able to test for the robustness of the variables for which we have found significant coefficients.[9]

We test the model for two types of group members, i.e. group leaders and regular group members. We use this approach since in the Eritrean programs the group leader plays a prominent role in the functioning of the group. In our analysis we specifically investigate whether this distinguishing feature has any consequences for the impact of peer monitoring and social ties on moral hazard behavior in a group. We have

[7] The list of variables used in the analysis with their expected signs is presented in the appendix to this chapter, table 7-A1.

[8] We acknowledge that the way we have set up the empirical model is potentially problematic, since (some of) the variables on the right-hand side can be endogenous, which may bias the estimation results. In particular, individuals will use information on misuse and repayment problems of potential group candidates when selecting group members. In order to solve the potential endogeneity problem we should have used valid instrumental variables. For instance, we should have used information on past behavior of group members and/or information on the behavior of individuals who were not chosen as group members. However, our current data does not allow for us to use this kind of information.

[9] The econometric approach we take is also known as the general-to-specific approach. Another way of approaching the econometric modeling is to take the specific-to-general (or bottoms-up) approach, which starts from a small model, including only theoretically correct variables and then test various specifications of this smaller model. There is some discussion about which of these two approaches is preferred (Brooks, 2002). One of the advantages of the approach we have taken is that "…the statistical consequences from excluding relevant variables are usually considered more serious than those from including irrelevant variables" (Brooks, 2002, pp.209-210).

102 observations to estimate the model. For the model focusing on the group leaders we use the information from the questionnaire as provided by these 102 group leaders. For the model focusing on the other group members (249 observations) we use the averages of variables of the other group members of each of the 102 groups.[10]

Tables 7-1a and 7-1b provide descriptive statistics of all the variables used in the empirical investigation for both the group leaders and the other group members. The table shows that the statistics for most of the variables included in the empirical model do not differ much when comparing group leaders to the other group members. The only significant differences appears to concern INCOME, EDUCATION and DIST. Group leaders seem to have a higher income, they are somewhat higher educated, and the distance between them and the other group members is longer if we compare these outcomes with the averages of these three variables of the other group members. Moreover, it appears that among group leaders there are more men than among the other group members (GENDUM).

Table 7-2 provides the results of the empirical analysis. In the table Z-statistics are given in parentheses. Equation 2-1 in the table shows the results of the complete model using information for the other group members. Interestingly, none of the variables of peer monitoring and social ties has a statistically significant coefficient while most of the other variables do, indicating that peer monitoring and social ties of other group members do not play a role in mitigating misuse of loans by group members.

[10] We use averages of variables instead of medians, because the number of group members (other than the group leader) we have interviewed was 2 or 3 in most cases. Because of this rather low number and because many variables in our analysis are (0,1) dummy variables, using the average better represents the underlying data.

Table 7-1a Descriptive statistics of the variables used in the empirical analysis

	Group Leaders				
	Mean	Median	Max.	Min.	Std.Dev
DEPENDENT VARIABLE					
ABUSES*	0.23	0	1	0	0.42
PEER MONITORING					
KNACTDUM	0.90	1	1	0	0.30
KNSELDUM	0.04	0	1	0	0.20
DIST	630.1	325	5,000	5	1,056.4
VISTDUM	0.71	1	1	0	0.46
SOCIAL TIES					
BOGROUP	0.55	1	1	0	0.50
KNMEMDUM	0.84	1	1	0	0.37
CHGRDUM	0.09	0	1	0	0.29
PERSONAL CHARACTERISTICS					
AGE	45.5	44.5	75	22	11.75
GENDUM	0.53	1	1	0	0.50
EDUCATION	2.2	2	4	1	0.87
MOSLDUM	0.25	0	1	0	0.44
MARDUM	0.80	1	1	0	0.40
INCOME	1,108.8	1,000	2,000	600	385.1
OTHER VARIABLES					
PROVISIT*	0.84	1	1	0	0.37
GRAGRDUM*	0.28	0	1	0	0.45
VFACCESS	1.26	1	4	1	0.56
SAMESEX*	0.58	1	1	0	0.50
ACORDUM*	0.45	0	1	0	0.50
LEADERRESP**					

Notes:
* These variables refer to the group as a whole (i.e. including both the group leader and the other group members). Therefore, the figures in the table are similar for both group leaders and other group members.
** This variable is only relevant for the other group members; the question related to this variable was only posed to the other group members.

Table 7-1b Descriptive statistics of the variables used in the empirical analysis

	Other group members				
	Mean	Median	Max.	Min.	Std.Dev
DEPENDENT VARIABLE					
ABUSES*	0.23	0	1	0	0.42
PEER MONITORING					
KNACTDUM	0.90	1	1	0	0.21
KNSELDUM	0.05	0	1	0	0.18
DIST	377.1	240	2,766.7	5	444.4
VISTDUM	0.77	1	1	0	0.34
SOCIAL TIES					
BOGROUP	0.54	0.5	1	0	0.43
KNMEMDUM	0.82	1	1	0	0.30
CHGRDUM	0.10	0	1	0	0.22
PERSONAL CHARACTERISTICS					
AGE	46.5	47.5	68.5	22	9.11
GENDUM	0.45	0.33	1	0	0.43
EDUCATION	1.8	2	3	1	0.61
MOSLDUM	0.28	0	1	0	0.43
MARDUM	0.80	1	1	0	0.32
INCOME	957.6	900	7,250	350	697.7
OTHER VARIABLES					
PROVISIT*	0.84	1	1	0	0.37
GRAGRDUM*	0.28	0	1	0	0.45
VFACCESS	1.44	1.33	5	1	0.60
SAMESEX*	0.58	1	1	0	0.50
ACORDUM*	0.45	0	1	0	0.50
LEADERRESP**	1.53	1.5	3	1	0.45

Notes:
* These variables refer to the group as a whole (i.e. including both the group leader and the other group members). Therefore, the figures in the table are similar for both group leaders and other group members.
** This variable is only relevant for the other group members; the question related to this variable was only posed to the other group members.

Yet, if we concentrate on the group leaders only our results indicate that peer monitoring by and social ties of group leaders do play a role in mitigating moral hazard problems within groups (equations 2-2 to 2-5). In particular, the table shows that in the complete model (equation 2-2) we find a statistically significant coefficient for one of the four peer monitoring variables (DIST) and one coefficient that is very close to being statistically significant (VISTDUM). Moreover, we find statistically significant coefficients for two of the three social ties variables (KNMEMDUM and CHGRDUM). All four variables have the expected sign. Of the control variables we find statistically significant coefficients for VFACCESS and SAMESEX, while the coefficient for INCOME is almost statistically significant.

With respect to peer monitoring the results suggest that if the group leader regularly visits the other group members, the risk of moral hazard is reduced. Moreover, if the distance between the group leader and the other members increases, the probability of moral hazard increases. With respect to social ties, the results show that if the group leader has known the other group members before the group was formed, this reduces the chance of moral hazard. At the same time, if the group leader was a member of at least one other group in the past, this increases the probability of moral hazard, since switching between groups indicates that social ties are looser and also that the knowledge the group leader has of the other group members is less.

The results for the importance of peer monitoring and social ties of the group leader are robust. The coefficients for DIST, VISTDUM, KNMEMDUM and CHGRDUM remain to be statistically significant, and for all four variables the coefficients continue to show the right sign, even after three consecutive rounds of deleting variables; in the first two rounds we delete those variables for which the Z-statistic of the coefficient is less than 1 (equations 2-3 and 2-4), and in the last round we delete all variables that remain to be statistically insignificant, i.e. that have a Z-statistic of less than 1.64 (equation 2-5). Moreover, the value of the

coefficients of three of the four variables remains relatively stable,[11] which again suggests that the results we have found are robust.

The results presented in table 7-2 support the hypothesis that since the group leader in the Eritrean programs seems to play a prominent role in the functioning of the group, this reduces the probability of moral hazard due to the monitoring activities and social ties of the group leader. Monitoring activities and social ties of other group members do not have such consequences.

The results can be interpreted as follows.[12] To start with, they may indicate that only group leaders really do monitor and make use of social ties, which then has a mitigating effect on moral hazard behavior among group members. This means that for instance in the case of the peer monitoring variable VISTDUM, if the group leader visits the other group members this leads to peer monitoring, whereas if other group members visit other members this does not lead to peer monitoring. Similar interpretations hold for the other variables on peer monitoring and social ties. Put differently, in case of the group leaders the monitoring and social ties variables actually do measure peer monitoring activities and social ties, whereas for the other group members they do not. This may be true if group members free-ride on the efforts of their group leader to reduce the of moral hazard. As described in the Eritrean programs, a group leader plays quite an important role as the group representative to the program organization and he may generate all kinds of activities that may help improve repayment performance of the group he represents. This may mean that other group members do not make much of an effort of monitoring of group members, especially since these efforts may be costly and time consuming.

[11] Only the coefficient for CHGRDUM drops significantly: from 2.34 in equation 2-2 to 1.35 in 2-5.

[12] Unfortunately, our analysis does not allow us to decide which of the two interpretations is most likely to hold in practice. Future research should address this question.

Table 7-2 Logit estimation of determinants of misuse of loans by group members

	2-1	2-2	2-3	2-4	2-5
	Other group members	Group leaders	Group leaders	Group leaders	Group leaders
PEER MONITORING					
KNACTDUM	-1.508	-0.882			
	(-1.19)	(-0.70)			
KNSELDUM	0.807	1.710	1.168		
	(0.63)	(1.26)	(0.97)		
DIST	0.0001	0.001**	0.001***	0.001***	0.001***
	(0.24)	(2.45)	(2.79)	(2.84)	(3.06)
VISTDUM	-0.843	-1.740	-1.398*	-1.337**	-1.343**
	(-1.05)	(-1.51)	(-1.89)	(-1.98)	(-2.03)
SOCIAL TIES					
BOGROUP	-0.340	0.596			
	(-0.49)	(0.84)			
KNMEMDUM	0.649	-2.511**	-1.958**	-1.677**	-1.709**
	(0.51)	(-2.41)	(-2.48)	(-2.30)	(-2.34)
CHGRDUM	-0.248	2.339**	1.517*	1.381*	1.345*
	(-0.21)	(1.99)	(1.72)	(1.64)	(1.64)
PERSONAL CHARACTERISTICS					
AGE	-0.075*	-0.017			
	(-1.79)	(-0.30)			
GENDUM	1.365	-0.065			
	(1.16)	(-0.05)			
EDUCATION	0.489	-0.601			
	(1.09)	(-0.67)			
MOSLDUM	0.494	0.407			
	(0.52)	(0.49)			
MARDUM	0.482	1.248	0.877	0.857	
	(0.49)	(1.37)	(1.32)	(1.36)	
INCOME	-0.001	0.002	0.002*	0.002*	0.002*
	(-1.14)	(1.60)	(1.76)	(1.85)	(1.81)
OTHER VARIABLES					
PROVISIT	0.007	2.211			
	(0.01)	(0.97)			
GRAGRDUM	0.599	0.967	0.571		
	(1.06)	(1.02)	(0.77)		
VFACCESS	-0.480	1.039*	0.707*	0.718*	0.767**
	(-0.93)	(1.68)	(1.72)	(1.90)	(2.00)
SAMESEX	1.631**	2.062**	1.943***	1.725***	1.811***
	(2.50)	(2.38)	(3.24)	(2.98)	(3.18)
LEADERRESP		1.173	0.703		
		(1.15)	(0.97)		
ACORDUM	0.895	0.702			
	(0.97)	(0.52)			
CONSTANT	1.751	-7.586*	-5.748***	-4.523***	-3.659**
	(0.54)	(-1.70)	(-2.86)	(-2.78)	(-2.48)
Number of observations	102	102	102	102	102
Observations with dependent = 0	79	79	79	79	79
% Correctly predicted	87	83	82	82	76
McFadden R^2	0.13	0.36	0.31	0.29	0.28
LR statistic (degrees of freedom)	13.91 (18)	39.14 (19)	34.26 (11)	31.62 (8)	30.46 (7)

Note: Z-statistics are given between parentheses. *, ** and *** denote significant at the 10, 5 and 1 per cent level, respectively.

Another way to interpret the results is that they may indicate that monitoring by and social ties of group leaders is efficient in reducing moral hazard behavior, whereas monitoring by and social ties of other group members is not. Thus, for instance in the case of VISTDUM, if the group leader visits other group members and this leads to monitoring activities, this reduces the probability of moral hazard, whereas if other group members visit other members and this leads to monitoring, this does not reduce the likelihood of moral hazard. Apparently, group members only feel pressured to behave prudently when the group leader monitors, perhaps because he may have more means to sanction moral hazard behavior by group members due to his role as the representative of the group to the program organization.

One important issue that remains to be clarified is the question why someone would want to be the group leader, given the fact that this position may be quite burdensome and responsible, it does not generate any (financial) reward, and that other group members may try to free-ride on the monitoring efforts of the group leader. Again, there may be two different explanations for this. First, individuals may attach a high value to becoming a group leader, even if it does not lead to a financial reward. Being a group leader and carrying out the responsible task of representing the group to the program organization generates a number of (non-financial) obligations of the other group members to the group leader, which he may claim at a later date (Warning and Sadoulet, 1998). Thus, if an individual decides to become the group leader, he may count on help from the group members at some point in the future, say, when he wants to build a house or when he harvests his crops. In a rural society with underdeveloped markets and institutions such non-financial obligations may play an important role in the survival strategy of individuals.

Alternatively, the results of our empirical analysis may also provide at least a partial answer to the question why individuals seem to be willing to become group leader. One of the control variables, VFACCESS, indicates the value a group member attaches to having access to loans from the credit program in the future; a higher value for this variable shows that an individual attaches a lower value to having loans from the program in the

future. This variable appears to be insignificant in the estimations for the other group members (equation 2-1), yet it is significant and has a positive sign in the estimations for the group leaders (equations 2-2 to 2-5). Therefore, this suggests that if group leaders attach a high value to having future access to loans from the program, this reduces the probability of moral hazard. This relationship does not exist for the other group members. Our interpretation of this result is that group leaders may be those individuals who have the strongest incentives to repay the current loans, because they – more than the other group members – want to have future access to loans. This in turn may give them incentives to take the lead in making their group repay its current loan.

7.5 Conclusions

This chapter has investigated whether peer monitoring and social ties reduce the occurrence of moral hazard in the setting of two group-based lending programs in Eritrea. More specifically, in our analysis we have looked at peer monitoring and social ties of two types of group members: the group leader and the regular group members. We show that peer monitoring by and social ties of the group leader may help to reduce moral hazard behavior of group members. In particular, our results indicate that regular contact and a short physical distance between the group leader and the other members helps to reduce misuse of loans by individual group members. Moreover, if the group leader knows the other group members before the group is formed and if he has never changed groups, this reduces the probability of moral hazard within the group. We have found no link between peer monitoring and social ties on the one hand and the occurrence of moral hazard on the other hand if we use data for the other group members.

To the best of our knowledge, this study is the first attempt to investigate the different impact of monitoring efforts and social ties of different types of group members.

APPENDIX: List of variables used in the analysis with expected signs

Table 7-A1 List of variables with their expected signs

INDEPENDENT VARIABLES	**EXPECTED SIGNS**	
	Other Group Member Variables	Group Leader Variables
PEER MONITORING		
KNACTDUM	-	-
KNSELDUM	-	-
DIST	+	+
VISITDUM	-	-
SOCIAL TIES		
BOGROUP	-	-
KNMEMDUM	-	-
CHGRDUM	+	+
PERSONAL CHARACTERISTICS		
AGE	+/-	+/-
GENDUM	+/-	+/-
EDUCATION	+/-	+/-
MOSLDUM	+/-	+/-
MARDUM	+/-	+/-
INCOME	+/-	+/-
OTHER VARIABLES		
VFACCESS	-	-
LEADERRESP	+/-	
PROVISIT	+/-	
GRAGRDUM	-	
SAMESEX	+/-	
ACORDUM	+/-	

Chapter 8 Group-based Lending and Adverse Selection: A Study on Risk Behavior and Group Formation[1]

8.1 Introduction

This chapter deals with group formation and the adverse selection problem. In several theoretical papers (e.g. Ghatak, 2000) it has been shown that a debt contract with a joint liability component will lead to assortative matching (homogeneous matching), implying that safe borrowers will group with safe borrowers. The risky borrowers will not be allowed to form a group with safe borrowers and hence have to rely on stand-alone debt contracts. It can be shown that the assortative matching may imply that the choice for a joint liability debt contract or a stand-alone debt contract gives the bank information on the type of borrower. This may, under certain conditions, solve the adverse-selection problem in situations of asymmetric information.

In theory therefore, joint liability debt contracts may help to solve the adverse selection problem in situations of asymmetric information. However, as is so often the case, empirical evidence on this is lagging behind. This chapter takes up the challenge to empirically contribute to the question whether joint liability lending may reduce adverse selection problems. Since it is not possible to directly test whether joint liability lending reduces adverse selection problems, an indirect approach is used. More specifically, this chapter examines whether joint liability lending leads to assortative matching in group formation. Since joint liability debt contracts only help to solve the adverse selection problem if assortative matching holds, testing for assortative matching provides an indirect test of the possibility that joint liability lending may help to solve the adverse selection problem.

There is some literature that argues that homogeneous matching only holds in a frictionless world (see Sadoulet and Carpenter, 2001, and the

[1] This chapter is based on Lensink and Mehrteab (2003).

references therein). However, the real world is characterized by frictions due to e.g. imperfect information, the unavailability of partners with the same risk characteristics, the inability to enforce contracts, and the inability to fully screen and monitor group members. The advocates of the matching frictions theory argue that heterogeneous matching might take place, but that the heterogeneity is entirely due to so-called matching frictions. In other words, the matching frictions theory suggests that there will be homogeneous matching in the case where the analysis controls for matching frictions. If there are matching frictions that lead to some heterogeneity, the matching is still essentially homogeneous; heterogeneity is simply due to frictions and therefore generates deviations from optimality. Yet, empirical evidence on the homogeneous matching hypothesis in general and the matching frictions theory in particular is scarce. One of the few exceptions is Sadoulet and Carpenter (2001) on microcredit groups in Guatemala.

This chapter examines the empirical relevance of the homogeneous matching hypothesis for two MFIs in Eritrea. The data we use has been described in chapter 5. Our data provides information that can be used to test the matching frictions hypothesis.

This chapter is organized as follows. Section 8.2 provides a survey of the literature on risk behavior and group formation; section 8.3 explains the methodology we use to test the matching frictions hypothesis; and section 8.4 explains how risk is measured, a variable that we need to test for homogeneous matching. Section 8.5 presents two groups of independent variables that are assumed to affect risk behaviour. Here factor analysis is applied to regroup these variables in a smaller number of factors. Risk behavior is estimated in section 8.6. The results of this equation are used in section 8.7 to test whether homogeneous matching holds if matching frictions are accounted for. Finally, section 8.8 concludes.

8.2 Group formation and homogeneous matching: a literature review

Most of the matching literature draws heavily from the work of Becker (1993), who has worked extensively on marriage matching theory. Ghatak

and Guinnane (1999) present a model indicating that the group self-selection process leads to homogeneous matching. Their theoretical framework will be presented below – albeit in a shorter version.

It is assumed that output *R* takes two values: high (R^h) or low (R^L), where $R^h > R^L \geq 0$. For simplicity, we normalize R^L to be equal to zero. We have two types of borrowers and both borrowers are risk-neutral; one is safe while the other is risky. Output is high with probability $p \in (0, 1)$. p_s and p_r indicate the likeliness of success by safe and risky borrowers, respectively. The risky type fails more often than the safe one ($p_s > p_r$). Yet, the risky borrower receives higher returns if he succeeds. For simplicity, it is assumed that the expected net returns are equal for both safe and risky types:

$$E(R_i) = p_s R_s = p_r R_r = \overline{R} \qquad (1)$$

The best way for banks to separate the safe borrower from the risky borrower is to ask borrowers to pledge collateral. Risky borrowers are likely to fail more often and lose their collateral. If a bank offers two sets of contracts, one with high interest rate and lower collateral and the other with lower interest rate and higher collateral, the risky borrower will choose the former and the safe borrower the later contract. On the basis of interest rate and collateral the bank may be able to distinguish the risky borrower from the safe one. But since the poor in developing countries do not have any serious assets to offer as collateral, banks have no effective way to distinguish between safe and risky borrowers.

With the help of the joint liability mechanism the bank will be able to distinguish the risky from the safe borrower. In the end, the expected result is that the safe types select their likes and form a group in order to acquire loans from the bank, while the risky ones prefer individual loans. As a consequence, the bank can screen borrowers by varying the degree of joint liability. Under a joint liability contract each borrower pays nothing if his/her project fails, and an amount r if his/her project is successful. Here r is assumed to be exogenously determined. In addition, the successful borrower pays a joint-liability payment c if the other member

of the group fails. The expected net return of a safe type teamed with a risky type is then:

$$E(\Pi)_{sr}(r,c) = p_s p_r (R^h - r) + p_s (1 - p_r)(R^h - r - c) \quad (2)$$

$$= p_s R^h - \{ r p_s + p_s (1 - p_r) c \} \quad (3)$$

Similar calculations could be performed for exclusively safe and risky groups. Since safe types are always preferred as partners, the question becomes: will the risky types be willing to make a large enough transfer to the safe types so that both risky and safe types do better together? The logic behind this transfer is that in case the risky borrower defaults the safe member is going to pay c to the bank. Therefore, the transfer of money from the risky to the safe borrower is to compensate the safe borrower.

The net expected gain of risky borrower from having a safe partner is

$$E(\Pi)_{sr}(r,c) - E(\Pi)_{rr}(r,c) = p_r (p_s - p_r) c \quad (4)$$

Similarly, the net expected loss for a safe borrower of having a risk partner is

$$E(\Pi)_{ss}(r,c) - E(\Pi)_{sr}(r,c) = p_s (p_s - p_r) c \quad (5)$$

By comparing expected returns under alternative scenarios, we can calculate that a safe type will require a transfer of at least $p_s(p_s - p_r)\, c$ to agree to form a partnership with a risky type. Will the risky type be willing to pay that much? His expected net gain from joining a safe type is as much as $p_r(p_s - p_r)\, c$. If $c > 0$ and since $p_r < p_s$, the expected gains to a risky type are always smaller than the expected losses to a safe type. Hence, a risky borrower will not find it profitable to have a safe partner. While every borrower wants to have a safe partner, safe borrowers value safe partners more than risky borrowers value safe borrowers. Hence, a risky borrower cannot cross-subsidize a safe borrower in order to be accepted as a partner, leading to groups containing partners with similar

risk behavior. Group formation will display positive assortative matching under joint liability contract.

Ghatak (2000) goes one step further. He shows that if banks can offer a continuum of joint liability and stand-alone debt contracts, incentive compatible separating equilibria may be the result. The safe types prefer a combination of a high joint liability component and a low lending rate, whereas the opposite will hold for a risky borrower. By choosing a joint liability debt contract a borrower signals that he/she is a safe borrower. Ghatak (2000) shows that a joint liability debt contract by solving the adverse selection problem can lead to a Pareto optimal solution.[2]

Xinhau Gu (2000) also deals with the formation of borrowing groups through the exploitation of local information and joint liability. He states that static models implicitly assume a borrower to always be endowed with acceptable (viable) projects. However, entrepreneurs usually have difficulties finding investment opportunities, and dynamic search models are useful tools to address such problems. He examines the impact of uncertainty about investment opportunities on the borrowers' project search decision and on the rate of loan repayment. He shows that safe borrowers prefer to group with safe borrowers since the effective cost of borrowing is positively related to risk taking by group members.

Laffont (2000) shows the role of group lending in differentiating between borrowers of different types (adverse selection). He states that group-lending contracts offer a subtle method of distinguishing between borrowers. When collusion between borrowers under complete information is allowed for, group lending as an instrument improves discrimination between entrepreneurs of different types. So, similar types group together.

[2] For an extension of this model and other related models see Gangopadhyay and Lensink (2001), Xinhau Gu (2000), and Laffont (2000). See also Gangopadhyay, Ghatak, and Lensink (2005).

Sadoulet (1999) presents a model that challenges the commonly assumed homogeneous matching hypothesis. In his model, group membership is endogenous, and group performance depends on both members' types and on the distribution of those types. According to Sadoulet, group members choose partners in a context of missing insurance markets. The point he wants to make is that if insurance markets are missing, homogeneity is not optimal anymore. Heterogeneity emerges as a constrained first-best choice. Sadoulet suggests that members set up insurance arrangements within their group, in which partners will cover each other's loans in case a project fails. The reason for insurance is that borrowers live and work in risky environments and hence need insurance. If a member who is able to insure a partner in need, refuses to pay for him, together with the other member he will lose access to future loans from the program because of the joint liability principle. Alongside these insurance arrangements there are transfer payments between members when both members are successful to remunerate the safe one for covering for the risky one in times of need. Thus, this insurance arrangement is taken to be an important part of the group formation process.

To this end, Sadoulet's model suggests a non-monotonic matching pattern in which safer borrowers will always form groups heterogeneously with partners riskier than themselves. Middle-type borrowers match either heterogeneously with safer borrowers or homogeneously with borrowers of their type depending on whether these are available. Finally, the riskier borrowers match homogeneously.

Note that the models by Ghatak (1999) and Sadoulet (1999) are similar. Ghatak gets homogeneous matching since his model is static, whereas Sadoulet gets heterogeneous matching since his model is repeated. Moreover, in the model by Ghatak the benefit of homogeneous matching is that it improves repayment rates and thus leads to lower interest rates. The problem is that the decrease in the interest rate cannot compensate the safe borrowers for having to cover the risky borrowers' loans if they fail. So, safe and risky borrowers will not form groups. In the model by Sadoulet the benefit is not lower interest rates but access to future loans, which has a much higher direct value.

Armendáriz De Aghion and Gollier (2000) state that in urban economies with heterogeneous, anonymous, and relatively mobile borrowers, random (rather than assortative) matching is incentive compatible for all types of borrowers. A particular feature of their paper is that they assume that borrowers do not know each other. They show that cross-subsidisation among members provides a kind of a collateral that reduces the negative externalities from risky to safe borrowers. The main implication of their work is that, as we move away from village economies by allowing for imperfect information, assortative matching no longer leads to an equilibrium situation, and yet group lending can improve efficiency and enhance welfare.

There are few empirical studies available that have rigorously tested the homogeneous matching hypothesis. Most empirical studies have simply assumed that homogeneous matching takes place. Some studies, however, do provide some insights. For instance, for groups belonging to BancoSol, Bolivia, Van Tassel (2000) found that groups match heterogeneously in unobservable business characteristics.

The only empirical paper available that has rigorously tried to investigate the matching of group members is the one by Sadoulet and Carpenter (2001). For credit groups in Guatemala they estimated the relationship between risk and the level of risk heterogeneity in the individual groups, explicitly accounting for the endogeneity of group formation and of borrowers' choice of project risk. Their results show that borrowers in Guatemala group heterogeneously, and that the heterogeneity cannot be explained by matching frictions. In line with the theoretical paper by Sadoulet (1999) they suggest that borrowers might want to form heterogeneous groups in order to set up insurance arrangements.

8.3 The methodology: the role of matching frictions

We follow the methodology set out by Sadoulet and Carpenter (2001). The reader is referred to their paper for a detailed explanation of the methodology. The main problem we have to deal with is as follows. In a frictionless world, the assortative matching theory implies that all

borrowers will choose their first-best risk level, and will match together with partners with the same (first-best) risk level. However, if there are matching frictions, borrowers may be forced to match with partners of a different risk level, even if they prefer to match with borrowers of the same risk type.

The matching frictions theory states that homogeneous matching only holds in a frictionless world and that all heterogeneity comes from matching frictions. This implies that there should be no statistically significant relationship between first-best risk (risk in a frictionless world) and heterogeneity. In order to test this theory, we need indicators for first-best risk and matching frictions. The problem is that these variables are not observable. Sadoulet and Carpenter (2001) solve this problem as follows. If there are matching frictions, the level of risk heterogeneity of borrower *i* (h_i) depends on her first-best risk choice (r_i^*) and on matching frictions (f_i)[3]

$$h_i = H(r_i^*, f_i) \tag{6}$$

Since with matching frictions a borrower may not be able to match with his/her preferred partners, he/she may decide to adjust his/her own risk choice. This implies that the risk level a borrower chooses (the observed risk, r_i) is a function of characteristics that affect the first-best risk choice (X_i) and the heterogeneity he/she is faced with, i.e.

$$r_i = R(X_i, h_i) \tag{7}$$

If equation (6) is substituted in equation (7) a reduced form expression for the observed risk level can be obtained

$$r_i = k(X_i, f_i) \tag{8}$$

[3] In fact *f* refers to a matrix of variables determining the friction level f_i.

The full system of equations (the structural model) can now be specified as:

$$h_i = H(r_i^*, f_i) \tag{9}$$

$$r_i = k(X_i, f_i) \tag{10}$$

$$r_i^* = k(X_i, 0) \tag{11}$$

If the matching frictions hypothesis holds, then $\frac{\partial h_i}{\partial r_i^*} = 0$. It may be useful to compare this condition with the condition for homogeneous matching in a frictionless world. In a frictionless world with homogeneous matching h_i should be zero in all groups. So, heterogeneity between all members within a group and hence group heterogeneity will then be zero. In this situation, the test for homogeneous matching could be based on a measure of group heterogeneity. Simply testing whether this measure is equal to zero would do. However, with matching frictions h_i does not need to be equal to zero. The correct test is $\frac{\partial h_i}{\partial r_i^*} = 0$, which implies that homogeneous matching cannot be confirmed or rejected by testing whether a measure for group heterogeneity differs from zero. In order to correctly test the matching frictions theory, we need variables for risk and heterogeneity at the individual level. The risk level a borrower chooses depends on the heterogeneity he/she is faced with. Since the heterogeneity an individual borrower is faced with is greater, the more his/her risk level is away from the group mean, a group heterogeneity measure, which gives the same heterogeneity level for all members in a group, cannot be used. In the next section we will explain how we measure risk. Section 8.7 will explain how we measure heterogeneity. But first we need to complete the discussion of the empirical methodology.

The trick is to first estimate the actual risk equation, for which we take, for reasons of convenience, a linear specification:

$$r_i = X_i\alpha + f_i\beta + \varepsilon_i \tag{12}$$

From this regression, estimated values for first-best risk and matching frictions can be obtained:

$$\overline{r_i^*} = X_i \overline{\alpha} \quad (13)$$

$$\overline{\beta f_i} = f_i \overline{\beta} \quad (14)$$

These estimated values are then substituted in the equation for heterogeneity:

$$h_i = \alpha + \gamma \overline{r_i^*} + \delta \overline{\beta f}_i + \varepsilon_i \quad (15)$$

Homogeneous matching will be empirically confirmed if $\gamma = 0$. It is expected that $\delta \geq 0$.

8.4 How to measure risk

The first step in the analysis is to develop a measure for risk, which is needed to estimate the risk equation (equation 12). Note that in the theoretical models it is assumed that there is only one project available per individual, which implies that projects and borrowers are interchangeable. This also implies that the theoretical measure for risk refers to both the riskiness of the borrower and the project. However, empirically there is no perfect measure for this theoretical risk concept available. We proxy the theoretical concept of risk by developing a measure for the risk of a borrower's repayment strategy. Even this is not directly measurable and therefore has to be proxied by an (admittedly imperfect) indicator. In line with Sadoulet and Carpenter (2001), we proxy risk (r) by:

$r_i = \frac{P_i - S_i}{P_i}$, for $P_i \geq S_i$

and $r_i = 0$ for $P_i < S$

where P_i is the loan payment due per month and S_i is the amount the borrower reports to have saved one week before the due date to cover the

loan payments.[4] The risk indicator varies between 0 and 1. The higher the percentage amount saved a week before the repayment date, the lower the risk of a borrower's repayment strategy.

We consider loan payments due per month, since for the two microfinance programs in Eritrea the install payments members are supposed to make are monthly. In the questionnaire we asked the borrowers to specify the agreed install payment per month (P_i). We also asked borrowers to specify the average cumulative savings until one week before due date (S_i).

Table 8.1 gives information on the risk measure and on the variables used to construct this measure. The table also provides data on the credit amount.

Table 8-1 Information on credit and risk

	CREDIT SIZE	P	S	r
Mean	3961	422	356	0.17
Median	3500	380	300	0.09
Maximum	8500	2320	2080	1.00
Minimum	750	71.25	0.00	0.00
Std. Dev.	1802	315	272	0.213
Skewness	0.468	2.714	2.440	1.967
Kurtosis	2.406	13.008	12.257	7.761
Jarque-Bera	17.97	1895.87	1601.76	557.80
Observations	351	351	351	351

Note: all values (except for *r*) are in Nakfas. The Jarque-Bera statistic is a test for normality. The statistic has a χ^2 distribution with 2 degrees of freedom under the null hypothesis of normally distributed errors.

[4] Note that Sadoulet and Carpenter use the sum of expected sales in the last three days before the due date as the scaling factor, instead of P_i. Our questionnaire also contains a question on the expected sales in the last days (one week in our case) before the due date. However, since the answers to this question were totally unreliable we decided to scale by P_i .

The value of loans ranges from 750 Nakfas to 8500 Nakfas, with mean and median loan sizes of 3961 and 3500 Nakfas, respectively. Loan terms vary from 3 to 24 months. The mean of our risk indicator is about 0.17, with an even lower median (0.09). Of the 351 borrowers 105 are left censored on the risk measure ($r = 0$), 10 are right censored ($r = 1$) and 236 are uncensored ($0 < r < 1$). Since $r = 0$ for a relatively high percentage of the group of borrowers, many borrowers show a tendency to save enough to repay the full monthly amount by the third week. Thus, borrowers seem to show a high degree of punctuality and a great readiness to save ahead of time in order to be sure of future access to credit from the program. Note that none of the variables is distributed normally.

It should be noted that a possible caveat of our risk measure is that a person who gets a fixed payment (more than P_i) in the week before the payment can be very safe despite the fact that $S_i = 0$. However, we do not think that this will substantially affect our results since in practice this does not seem to happen that often. Related to this problem, the validity of our measure may depend on the time profile for the different projects. Our measure may incorrectly give a higher risk ranking to a borrower with a project that yields an uncertain amount of income in the first week as compared to another borrower with a project that yields a certain amount of income in the fourth week. Since it is impossible to obtain detailed information about the time profile of returns for the different projects the loans are used for, this problem cannot be solved. But given the fact that the bulk of loans by the two programs in Eritrea are forwarded for the same purposes (trading) so that the time profile of most of the projects the loans are used for are probably similar, we are reasonably convinced about the validity of our risk proxy.

8.5 Variables proxying for first-best risk and matching frictions

The next step in the analysis is to determine which variables possibly affect risk, which of those variables are related to first-best risk and which of them are related to matching frictions. Hence, we need to determine a vector of variables X (first-best) and f (matching frictions).

8.5.1 Matching frictions (f)

Sadoulet and Carpenter (2001) argue that variables proxying for matching frictions include indicators of the degree of asymmetric information among different members of a group, proxies for the ability to monitor and screen the activities of the different members in a group, and variables on the available borrowing options. In line with Sadoulet and Carpenter (2001) we select from our data set the following list of variables related to monitoring, screening, the available information on other members, and the possibility to obtain credit.

- BOGROUP = a dummy variable with a 1 if the borrower is born in the village or town where the survey is conducted;
- CHGRDUM = a dummy variable with a 1 if the group member has been a member of another group;
- KNMEMDUM = a dummy variable with a 1 if the borrower knew the members well before they formed the group;
- INTEGRITY = a dummy variable with a 1 if the borrower knew about the behavioral integrity of all his/her fellow group members before the formation of the group;
- KNACTDUM = a dummy variable with a 1 if the group member knows the economic activities of the other group members;
- KNPURPDUM = a dummy variable with a 1 if the borrower knows for what purpose the other group members acquired their latest loans;
- KNSELDUM = a dummy variable with a 1 if the borrower knows the monthly sales of the other group members;
- LDIST = the logarithm of the average distance of the business of the group member from that of the other group members;
- VISTDUM = a dummy variable with a 1 if the group member visits other group members;
- ARREAR = a dummy variable with a 1 if the borrower has had problems repaying his/her debt in the current loan cycle;
- OTHCREDIT = a dummy variable with a 1 if the borrower has other sources of credit;
- ACORDUM = a dummy variable with a 1 if the group belongs to the SZSCS;

- NOMEM = the number of members in a group.

From this list of variables, BOGROUP, CHGRDUM, KNMEMDUM, INTEGRITY primarily refer to social ties and peer screening variables. These are variables that indicate the amount of information members have on each other. These variables, with the exception of CHGRDUM, deal in particular with the available information before forming the group. An increase in the value of one of these indicators implies more information about each other that might increase the probability of better peer screening and stronger social ties. KNACTDUM, KNPURPDUM and KNSELDUM, LDIST and VISTDUM have to do with the (possibility of) peer monitoring. More visits among members and a shorter distance between members increase peer monitoring. More group members tend to increase monitoring efforts, but there is also more scope for free riding. ARREAR and OTHCREDIT refer to possibilities to obtain credit from other sources; OTHCREDIT directly measures whether a borrower has been able to raise funds from other sources than the microfinance institution, and ARREAR measures repayment problems and may indicate future possibilities to raise credit. ACORDUM and NOMEM are not directly related to the issues discussed so far but – as will become clear later on – they have been included since they are highly correlated to each other.

8.5.2 First-best risk

We assume that first-best risk can be picked up by variables that are directly related to the socio-economic situation of the borrower. We consider the following variables:

- LINC: the logarithm of total monthly income;
- AGE: the age of a borrower;
- GENDUM: a dummy with a 1 for a male, and a 0 for a female;
- ILLIT: a dummy with a 1 if the borrower is illiterate;
- PRIM: a dummy with a 1 if the borrower has had any primary education;

- SEC: a dummy with a 1 if the borrower has had any secondary education;
- GLEADER: a dummy with a 1 if the borrower is a group leader;
- MOSLDUM: a dummy with a 1 if the borrower is a Muslim.

The concepts matching frictions and first-best risk are latent variables, which cannot be observed directly. Above, we have selected a group of variables that is assumed to be related to matching frictions, and a group of variables that is assumed to be related to first-best risk. In order to better account for the high collinearity between some of the variables within the two groups, and in order to test whether we can reduce the number of independent variables by constructing a smaller amount of new composite variables, we performed a multiple factor analysis (MFA).

We started by applying a factor analysis to the indicators of the group of variables related to matching frictions. The analysis suggests that eleven indicators in this group can be divided into three underlying factors. The two remaining indicators (ARREAR and OTHCREDIT) are left out of this analysis since they have very low factor loadings, even if more underlying factors are allowed for. The factor loadings of the analysis are given in table 8-2.

The first factor mainly has to do with KNMEMDUM and INTEGRITY, suggesting that the underlying factor in this case relates to information members have about each other before they formed a group. ACORDUM and NOMEM mainly determine the second factor. NOMEM has a negative factor loading, which suggests that with respect to our sample the average number of members in credit groups from the SCSZS is lower than in groups from the SMCP. A closer look at the data set confirms this: the average number of members in credit groups from the SMCP is 5.2, whereas it is 3.6 for the SCSZS. The positive factor loading on VISTDUM suggests that members of credit groups from the SCSZS visit each other more regularly than those of the SMCP system. The third factor mainly has to do with KNPURPDUM and to a lesser extent with KNACTDUM. This may suggest that in this case the underlying factor

relates to information members have about each other's business, after the group has been formed.

Table 8-2 Factor loadings for factor analysis on matching frictions variables

	FACTOR1	FACTOR2	FACTOR3
ACORDUM	-0.146	0.916	0.129
BOGROUP	0.275	-0.227	-0.021
CHGRDUM	0.018	0.236	-0.019
KNMEMDUM	0.923	0.038	0.208
INTEGRITY	0.935	0.050	0.202
LDIST	-0.176		-0.025
KNACTDUM	0.226	-0.093	0.376
KNPURPDUM	0.058	0.120	0.733
KNSELDUM	0.102	0.185	0.048
VISTDUM	0.152	0.323	0.306
NOMEM	0.077	-0.632	0.019
Chi square Statistic: 24. 7; 25 Df; p-value: 0.479; CUMVAR=0.394			

Note: factor loadings smaller than 0.01 are not reported. Df denotes the degrees of freedom. CUMVAR gives the cumulative variance explained by the factors taken into account. The factor analysis is done on 323 observations (the common sample of all indicators; observations refer to members of both MFIs). The Chi square Statistic is a test of the hypothesis that three factors are sufficient versus the alternative that more are required. The P-value is the probability of being wrong when the null hypothesis is rejected (the plausibility of the null hypothesis. So, the smaller is the P-value, the less plausible is the null hypothesis).

In the remainder of the analysis we will use the three factors, instead of the eleven original indicators. We interpret FACTOR1 and FACTOR3 as factors that primarily have to do with the asymmetry of information among group members. FACTOR1 picks up information before forming the group; FACTOR3 picks up information after the group has been formed; and FACTOR2 primarily relates to being a member of a credit group within the SCSZS and the number of members within a group. The latter variable is important for risk taking since it gives information on a possible peer monitoring effort. Armendáriz De Aghion (1999, proposition 3, p.95) states that "a larger group size tends to increase peer

monitoring effort, due to a joint-responsibility, a cost-sharing, and a commitment effect. However, a larger group size (also) increases the scope for free riding in debt-repayment decisions".[5]

Next, we perform a factor analysis on the indicators for first-best risk. However, here the factor analysis showed that it is not possible to combine the indicators into a smaller group of underlying factors. The number of factors that has to be taken into account to accept the null hypothesis of sufficient factors is almost equal to the original amount of indicators. Therefore, we decided to proceed with the individual first-best indicators in the remainder of the analysis.

8.6 Estimating risk

The next step in the analysis is to examine the possible empirical relevance of our matching frictions and first-best risk variables for explaining risk of a borrower's liquidity strategy. In other words, the next step is the estimation of equation (12).

The dependent variable is the proxy for risk, r, which we have constructed. The independent variables are the eight first-best risk indicators, the three factors related to matching frictions, and the remaining two variables (ARREAR and OTHCREDIT), which are also related to matching frictions. To examine non-linear effects we also tried quadratic terms, but except for the quadratic term of LINC (LINC2) none of these appeared to be significant. Hence, they were left out of the analysis.

The constructed dependent variable is censored between 0 and 1. Therefore, we estimate with the Tobit estimation technique with left and right censoring (using normal distribution of error terms). We also present ordinary least squares (OLS) estimates to test for differences in outcome

[5] Note that in Armendáriz De Aghion (1999) groups are exogenously given. In practice, there is a tradeoff between the cost of group size (monitoring effort) and benefits of size (diversification, easier to cover one defaulting partner). Group size is thus endogenous. We ignore this problem in our analysis.

due to different estimation techniques. The estimation results are presented in table 8-3.

Equations 1A and 1B in table 8-3 show that LINC, LINC2, GLEADER, SEC, ARREAR and FACTOR2 significantly affect risk behavior. Since LINC has a significantly negative coefficient and LINC2 a significantly positive coefficient, there seems to be a non-linear relationship between the income of a borrower and his/her risk behavior. For low-income levels, an increase in income reduces risk, whereas it increases risk after a certain threshold level of income has been passed. Positive significant coefficients for GLEADER, SEC and ARREAR suggest that a group leader takes more chances than a normal group member, that members who are more educated take more risks, and that members who have had repayment problems in the past also take more chances. The negative coefficient for FACTOR2 implies that borrowers in a borrowing group belonging to the SZSCS take less risks. The underlying reason probably is that the numbers of members in credit groups belonging to the SZSCS are lower. Larger groups may lead to more risk taking of the individual members, possibly due to a better scope for freeriding. These results hold for both the OLS and Tobit estimates.

In equations 2A and 2B the regressions are repeated by ignoring the insignificant terms. These regressions confirm the results suggested by equations 1A and 1B. Finally, we re-estimate the equations by replacing ARREAR with AMARREAR (equations 3A and 3B). AMARREAR measures the amount of money that was involved when the borrower had problems repaying the debt, as a percentage of the loan size in the previous loan cycle. This indicator serves as an alternative indicator for ARREAR. The results of these regressions again confirm the basic message of equations 1A and 1B.

Table 8-3 Estimating results on risk

	1A	1B	2A	2B	3A	3B
Method	OLS	Tobit	OLS	Tobit	OLS	Tobit
LINC	-0.866***	-1.224***	-0.880***	-1.260***	-0.487***	-0.790***
	(-2.93)	(-3.48)	(-3.05)	(-3.63)	(-2.19)	(-2.77)
LINC2	0.055***	0.078****	0.056***	0.080***	0.029***	0.048***
	(2.73)	(3.31)	(2.86)	(3.48)	(1.93)	(2.51)
AGE	0.0002	0.0003				
	(0.22)	(0.21)				
GENDUM	-0.016	-0.029				
	(-0.63)	(-0.84)				
ILLIT	-0.029	-0.037				
	(-0.96)	(-0.91)				
PRIM	0.004	0.0020				
	(0.16)	(0.06)				
SEC	0.111***	0.149***	0.116***	0.157***	0.116***	0.148***
	(2.40)	(2.39)	(2.78)	(2.72)	(2.85)	(2.59)
GLEADER	0.0585***	0.073***	0.060***	0.074***	0.042***	0.049**
	(2.70)	(2.46)	(3.00)	(2.62)	(2.25)	(1.91)
MOSDUM	0.012	0.019				
	(0.40)	(0.47)				
ARREAR	0.320***	0.386***	0.321***	0.386***		
	(8.35)	(8.38)	(8.53)	(8.47)		
AMARREAR					0.399***	0.540***
					(6.72)	(7.61)
OTHCREDIT	0.0028	-0.0049				
	(0.06)	(-0.08)				
FACTOR1	-0.00076	0.0078				
	(-0.07)	(0.50)				
FACTOR2	-0.022***	-0.049***	-0.022***	-0.050***	-0.016***	-0.037***
	(-2.07)	(-3.16)	(-2.13)	(-3.25)	(-1.73)	(-2.74)
FACTOR3	-0.006	-0.011				
	(-0.47)	(-0.68)				
CONSTANT	3.443***	4.734***	3.480***	4.846***	2.092***	3.188***
	(3.18)	(3.64)	(3.28)	(3.78)	(2.54)	(3.03)
adj. R^2	0.39	0.40	0.40	0.41	0.49	0.53

Note: the amount of observations is 323 for all regressions. That is, although we have 351 members in our data sets, the number of members who belong to the 102 groups is just 323. t-values (z-values for Tobit) based on white Heteroskedasticity-consistent standard errors (for the OLS regressions) and QML (Huber/White) standard errors between parentheses. The Tobit estimates are done with left (0) and right (1) censoring; there are 94 left censured observations and 10 right censured observations.

Since FACTOR2 mainly has to do with three indicators – ACORDUM, VISTDUM and NOMEM – we also perform OLS and Tobit regressions in which FACTOR2 is replaced by one of these individual indicators. The regression results show that each of these individual terms, with the exception of the OLS estimate for NOMEM, is significant. Being a borrower from a credit group associated with the SZSCS has a negative effect on risk taking. The same holds for more visits among members of a credit group. An increase in the number of members of a credit group enhances risk-taking behavior of an individual borrower. The results are presented in table 8-4.

We are now able to come up with an estimate of $\overline{r_i^*} = X_i \overline{\alpha}$ and $\overline{\beta f_i} = f_i \beta$ (equations 13 and 14, section 8.3). To this end we use the estimation results of equation 2B (the Tobit estimates) presented in table 8-3. As we explained before, we argue that the variables that are related to the socioeconomic situation (i.e. LINC, LINC2, SEC and GLEADER) determine the risk choice in a frictionless world. The other variables (ARREAR and FACTOR2) are primarily related to matching frictions. By using the estimated coefficients of equation 2B (table 8-3) we can now come up with an estimate of $\overline{r_i^*}$, which we name FIRSTBEST, and $\overline{\beta f_i}$, which we name FRICTION.[6]

[6] We assume that the conditional mean ($E[y_i]$) of the Tobit regression equation $y_i = \beta x_i + \varepsilon_i$ equals $K_i\ x_i$. If all independent variables are taken into account, this predicts the so-called expected *latent variable.*

Table 8-4 Estimating risk by replacing FACTOR2 with ACORDUM, VISTDUM and NOMEM

	1A	1B	2A	2B	3A	3B
Method	OLS	Tobit	OLS	Tobit	OLS	Tobit
LINC	-0.833***	-1.179***	-0.800***	-1.074***	-0.840***	-1.166***
	(-2.95)	(-3.49)	(-2.87)	(-3.25)	(-2.89)	(-3.35)
LINC2	0.053***	0.076***	0.051***	0.068***	0.053***	0.074***
	(2.77)	(3.35)	(2.68)	(3.07)	(2.69)	(3.18)
SEC	0.085***	0.114***	0.078***	0.092***	0.109***	0.139***
	(2.25)	(2.04)	(2.12)	(1.70)	(2.64)	(2.47)
GLEADER	0.060***	0.075***	0.057***	0.071***	0.060***	0.074***
	(3.10)	(2.74)	(3.02)	(2.65)	(3.00)	(2.64)
ARREAR	0.324***	0.392***	0.316***	0.373***	0.318***	0.379***
	(8.74)	(8.73)	(8.66)	(8.54)	(8.50)	(8.39)
ACORDUM	-0.042***	-0.097***				
	(-2.31)	(-3.48)				
VISTDUM			-0.049***	-0.076***		
			(-2.37)	(-2.79)		
NOMEM					0.010	0.023***
					(1.43)	(2.40)
CONSTANT	3.310***	4.578***	3.224***	4.246***	3.301***	4.422***
	(3.21)	(3.68)	(3.17)	(3.48)	(3.08)	(3.43)
adj. R^2	0.39	0.41	0.39	0.41	0.39	0.41

See the note to table 8.3.

8.7 Heterogeneity

The final step in the analysis is to estimate the heterogeneity equation. Therefore, we first need to develop a measure of risk heterogeneity.

8.7.1 The measure for risk heterogeneity

In line with Sadoulet and Carpenter (2001) we measure risk heterogeneity (h_i) by:

$h_i = \left[\sum_{r_j \in G_i} \frac{(r_i - r_j)^2}{(N_i - 1)} \right]^{0.5} sign(r_i - \bar{r}_i)$, where $\bar{r}_i$ is the mean risk in *i*'s group G_i.

This proxy measures the average Euclidean distance between the risk of a borrower and all of his/her group partners. Note that our measure for heterogeneity is individual rather than group specific, as it should be. Moreover, the heterogeneity proxy gives higher degrees of heterogeneity for borrowers with a risk level that is further away from the mean risk level in the group – this is also in line with theory. We sign the average Euclidean distance in order to allow for possible differences in behaviour for the relative safe and relative risky borrowers in a group (which is in line with theories that examine group formation in the context of missing insurance markets). However, we also used a measure for heterogeneity that is not adjusted for having a risk above or below the mean risk. This gave qualitatively the same results. Since our space is limited, we have not presented these results.

Table 8.5 gives descriptive statistics of *h*.

Table 8.5 Heterogeneity

	h
Mean	-0.005
Median	-2.78E-17
Maximum	1.00
Minimum	-1.00
Std. Dev.	0.265
Skewness	0.115
Kurtosis	5.227
Jarque-Bera	72.65

Next, we will examine whether or not heterogeneity is caused by matching frictions. We will do this by estimating equation 15.

8.7.2 Estimation results

The estimates of the heterogeneity equation are presented in table 8.6.[7] Again we use the OLS as well as the Tobit estimation technique. The dependent variable in the regressions is our proxy for heterogeneity (*h*). It seems that the coefficient for FIRSTBEST is significantly different from zero at the 99 per cent level, which strongly suggests that homogeneous matching will not occur, even if the estimates are controlled for matching frictions.

Table 8.6 Estimating heterogeneity

	1	2
METHOD	Tobit	OLS
FIRSTBEST ($\bar{r}_i^*$)	0.663	0.660
	(3.20)	(3.19)
FRICTION ($\overline{\beta f_i}$)	0.623	0.620
	(5.54)	(5.52)
CONSTANT	3.129	3.115
	(3.13)	(3.13)
adj R^2	0.15	0.16

Note: the amount of observations is 323 for all regressions. t-values (z-values) for OLS *(*for Tobit*)* between parenthesis (based on White Heteroskedasticity-Consistent Standard Errors and Covariances and Huber/White robust standard errors and covariances, respectively). In equation 1 there is one right and one left censored observation.

A possible caveat of our analysis may be that we have not included all relevant variables in the equation for risk and that this affects our estimates. There may be some relevant matching frictions or first-best variables missing. This is for example suggested by the fact that there are

[7] It should be noted that the variables FIRSTBEST and FRICTIONS are measured with errors. OLS (and Tobit) estimates of the heterogeneity equation may therefore be biased. A possible solution, used by Sadoulet and Carpenter (2001), is to estimate the heterogeneity equation with instrumental variables. However, due to a lack of candidates for instruments in our sample we decided to rely on the OLS estimates.

only a few variables for matching frictions significantly. This may then lead to an omitted variable bias. The problem with omitted variable bias is that it may lead to a correlation between the disturbance term and one of the right-hand side variables. This may bias the estimates of the coefficient and standard error of X_i and f_i , which may consequently affect our estimates of the heterogeneity equation. However, note that we are not directly interested in the parameters in equation (12). We only use the fitted variables for first-best risk and matching frictions. It is easy to show that the predicted values are consistent estimators, so that we can be reasonably sure that our result with respect to FIRSTBEST and hence our conclusion that homogeneous matching does not hold is not affected by omitted variable bias because of a misspecification of the risk equation. Our approach of obtaining FIRSTBEST and FRICTION is somewhat comparable to an instrumental variable (IV) technique. As is well-known IV estimation is designed to overcome problems caused by correlation between the disturbance term and the right-hand side variables.

8.8 Conclusions

This chapter aims to provide new insights into the empirical relevance of the homogeneous matching hypothesis for microfinance groups in Eritrea. A better insight into group formation and whether these groups are homogeneous is extremely important for our understanding of the working of microfinance programs. The result of our analysis can be used as an input for the analysis of repayment performance of joint liability schemes versus individual liability debt contracts. It also provides indirect evidence on the reliability of the hypothesis that group lending by means of joint liability lending can reduce adverse selection problems.

The estimates with respect to risk behavior suggest that among the borrowers from the microfinance programs in Eritrea, there is a non-linear relationship between the income and risk taking. Below a certain threshold level of income, an increase in income will lead to less risk taking, whereas an increase in income above a certain level will increase risk taking. We also find that group leaders take more risk than regular group members, that better educated borrowers take more risk, and that

borrowers who have had repayment problems in the past will take more risk. Moreover, we find some evidence that borrowers in larger groups will take more risk than borrowers in smaller groups.

Concerning the homogeneous matching hypothesis, our results strongly indicate that groups are formed heterogeneously. Most importantly, we do not find support for the matching frictions hypothesis, in the sense that even if we control for matching frictions, credit groups in Eritrea do not seem to consist of borrowers of a similar risk type. The implication of this finding for repayment behavior is not clear beforehand. However, our result seems to be bad news for those who argue that group-based lending may reduce problems of adverse selection. In some theoretical papers it has been argued that incentive compatible separating equilibria will result if a lender offers different types of debt contracts, with varying components for joint liability. By choosing a particular debt contract, the borrower will reveal his/her type and hence the asymmetric information and consequently the adverse selection problem will be solved. However, this result is based on the homogeneous matching hypothesis.

Of course, some reservations with respect to our main conclusions can be made. For instance, the classification of variables in a group that primarily deals with matching frictions, and a group of variables dealing with first-best risk determinants may be criticized. In addition, our variables FIRSTBEST and FRICTION are constructed variables, and therefore are measured with error. This may bias the estimates of the coefficients. Moreover, the measure of risk we use may not be the most accurate measure for risk taking. There may exist other measures of risk that are better proxies. It may then be the case that using another measure for risk will lead to homogeneous matching, instead of the heterogeneous matching we found by using our measure for risk. More research on these issues is needed. Nevertheless, given the data we have, and taking into account all possible drawbacks of the methodology used, we think that our analysis, at the least, suggests that the commonly held assumption of homogeneous matching can not be confirmed for the case of Eritrea. If one accepts that groups are formed heterogeneously, an important issue is then to examine why this is so. A possible reason brought forward in

some recent papers is the insurance that risky and safe borrowers may provide. The models behind the homogeneous matching hypothesis assume that borrowers are risk neutral and that project returns do not covary. This implies that in these models there is no possibility to gain from economies of risk pooling. However, if borrowers are risk averse and project returns are not independent, a borrower may profit from grouping with another borrower if the project returns of the two borrowers are negatively correlated. This may then imply that heterogeneous matching is the optimal outcome.

APPENDIX: List of variables used in the analysis with expected signs

Table 8-A1 List of variables with their expected signs

INDEPENDENT VARIABLES	EXPECTED SIGNS
PEER MONITORING	
KNACTDUM	-
KNPURPDUM	-
KNSELDUM	-
LDIST	+
VISITDUM	-
SOCIAL TIES	
BOGROUP	-
KNMEMDUM	-
INTEGRITY	-
CHGRDUM	+
PERSONAL CHARACTERISTICS	
AGE	+/-
GENDUM	+/-
ILLIT	+/-
PRIM	+/-
SEC	+/-
MOSLDUM	+/-
LINC	+/-
OTHER VARIABLES	
OTHERCREDIT	-
GLEADER	+/-
AREAR	+
NOMEM	+/-
ACORDUM	+/-

Chapter 9 Summary and Recommendations for Further Research

9.1 Introduction

The last two decades have witnessed the emergence of financial institutions to reach low-income producers with affordable credit and suitable mechanisms. The origin of these institutions lies in Asia and Latin America and has now reached other parts of the world. They are called microfinance institutions, since they provide micro-loans to those members of societies who do not have access to credit from formal financial institutions.

Although we observe different models of microfinance that are operating in different parts of the world, they do have certain characteristics in common. One of the main common characteristics is their ability to curb problems that arise from asymmetry of information. MFIs can be broadly divided into group-based and individual-based lending. In this thesis we have focused on group-based lending.

Group-based lending requires individuals to organize themselves into groups to get access to financial services. Normally, in group-based lending loans are made out to individuals. However, all members of the group are held responsible for loan repayment – i.e. the joint liability principle.

Group-based lending contracts effectively make a borrower's neigbors cosigners to loans, mitigating problems that are created by informational asymmetries such as adverse selection, moral hazard, and enforcement of repayment. Thus, in group-lending programs, the functions of screening, monitoring, and enforcement of repayment are to a large extent transferred from the creditor to group members.

Several theories have emerged explaining how group-based lending mitigates adverse selection, moral hazard and enforcement problems

(Stiglitz, 1990; Ghatak, 1999; Besley and Coate, 1995). Yet, there are very few empirical studies to substantiate these theories. Most of the existing empirical works on group-based lending concentrate on poverty alleviation, outreach, sustainability and repayment performance of these programs (Hulme and Mosley, 1996; Morduch, 1999).

The aim of this thesis has been to investigate whether theoretical models explaining how group-based lending mitigates asymmetric information problems can be supported by empirical evidence. In particular, we have investigated the following research questions.

a) Is repayment performance of group-based lending programs positively influenced by monitoring activities of individual group members? Does it matter who these individuals are?
b) Do monitoring activities and social ties help to mitigate moral hazard behavior among individual members of groups in group-based lending programs? Does it matter who is monitoring and/or who has these social ties?
c) Do group members match homogeneously or heterogeneously in risk during the process of group formation?

These research questions have been addressed in the context of two group-based lending programs in Eritrea for which we have detailed data on screening, monitoring and enforcement activities, as well as information on personal characteristics of individual group members. The remainder of this chapter presents conclusions and recommendations for further research on the basis of the findings of the empirical chapters of this thesis. Although our conclusions are based on the experience in Eritrea alone, we feel that our findings may be of importance to understanding the functioning of group-based lending programs in other less developed countries.

9.2 Conclusions from the empirical investigations and suggestions for further research

9.2.1 Repayment performance and social ties of individual group members

In chapter 6 of this thesis we have investigated the determinants of repayment performance of groups. Several theories indicate that repayment performance is related to the screening, monitoring and enforcement of group members; and several earlier empirical studies show that repayment performance of groups is indeed determined by the screening, monitoring, and enforcement activities of its members. Some studies also show that social ties may matter. We have extended the existing empirical literature by emphasizing that it does matter who is carrying out these activities within the group when analyzing repayment performance of groups. In particular, we investigate whether differences in monitoring activities of group leaders versus other group members make a difference to the repayment performance of groups.

Most empirical studies use data of one individual member as a representative of his group and test group repayment performance. In our analysis, we use data of at least two group members: the group leader and at least one other member of the group. This permits us to separate the data into two parts: that is, variables describing the activities and characteristics of the group leader, and variables related to members other than the group leader. Consequently, we are able to test whether there are differences with respect to the role of the monitoring activities and social ties of group leaders vis-à-vis these activities and ties of other group members in reducing repayment problems of groups.

As has been explained in previous chapters, we have focused on the differences in behavior between the group leader versus the other group members, because when we visited the group-based lending programs in Eritrea, we noticed that group leaders in the Eritrean MFIs performed a lot of activities on behalf of the other group members. Therefore, we wanted to investigate whether their activities have a different impact on group

performance as compared to the same activities yet performed by other group members.

The results of our study suggest that there is evidence to support the hypothesis that there is a negative relationship between social ties of the group leader on the one hand, and the occurrence of repayment problems of individual group members on the other hand. We do not find any relationship between ties and repayment problems when we look at the social ties of other group members. These results suggest that group leaders really make use of existing social ties to improve repayment performance of their group, whereas this is not necessarily true for regular group members. Alternatively, the results may suggest that social ties of group leaders are effective in reducing repayment problems of groups, whereas this does not hold for the ties of other group members.

To the best of our knowledge, our research is the first attempt to empirically investigate differences in behavior of different group members and their effect on group performance. The study shows it is important to take into account differences in behavior of different types of members in a group when investigating monitoring activities and their effects on group performance. It may also question the value of existing theoretical models on group-based lending, since these models explain how these programs work by assuming that all group members perform the same kind of monitoring activities. According to our study this is clearly not the case – at least not in Eritrea. Future research should focus on carrying out similar empirical investigations in other program and/or country contexts to see whether our results are more generally valid.

9.2.2 Moral hazard behavior and monitoring activities of individual group members

The aim of chapter 7 has been to test whether monitoring and social ties of different types of group members reduce moral hazard behavior of members. Joint liability lending theories present models that illustrate how the group-based lending mechanism reduces moral hazard problems. Individuals come together of their own free will to form borrowing groups

and they promise to be jointly liable for each other. In order not to end up paying for a defaulting member, each member monitors the other members' investment behavior. Thus, group-based lending programs delegate costly monitoring activities to group members, which may help these programs to reduce their lending costs.

While there are plenty theoretical studies on the relationship between group monitoring and moral hazard behavior, very few empirical tests have been conducted to determine the validity of these theoretical claims. We have investigated whether monitoring and the social ties of different types of group members reduce the occurrence of moral hazard in the two group-based lending programs in Eritrea. As shown in chapter 6, we studied this by dividing the sample data into variables related to group members other than the group leader and variables related to group leaders only. The rationale for this approach has been explained in previous chapters.

We have found support for the fact that monitoring activities and social ties of group leaders may help to reduce moral hazard behavior of group members. In particular, our results indicate that regular contact and a short physical distance between the group leader and the other group members help to reduce misuse of loans by individual group members. Moreover, if the group leader has known the other group members before forming the group, and if he has not changed groups in the past, this reduces the probability of moral hazard within the group. We have found no link between monitoring activities and the social ties of other group members other than the group leader and the occurrence of moral hazard within the group.

The empirical findings in chapter 7 are in line with the findings in chapter 6. As discussed, in chapter 7 we have found that monitoring and social ties of the group leader may help to mitigate moral hazard behavior of group members. Similarly, chapter 6 shows that social ties of the group leader help to reduce the repayment problems of individual group members. These findings support the presumption that if monitoring

reduces moral hazard behavior among group members, this indirectly improves the repayment performance of groups.

The findings in both chapters 6 and 7 point out that it is important to take into account differences in behavior of different types of group members. The results reported in both chapters raise a number of issues that could also be studied. Most importantly, further analysis is needed to find out whether the structure of group-based lending in Eritrea, in which group leaders seem to be the ones who contribute most to the reduction of the probability of moral hazard and to improving repayment performance, is an effective one. This structure seems to put much emphasis on the role of just one individual, i.e. the group leader, while the rest of the group members can free-ride on his efforts. This may not be informationally efficient. On the other hand, although the literature explaining monitoring within groups normally assumes that everybody is monitoring everybody else, some papers have pointed out that this may also not be informationally efficient, since the costs of monitoring become too high in such a model. Armendáriz De Aghion (1999) has called the above type of monitoring – where each member of the group is always monitored by all of his peers – the mutual monitoring structure. The mutual monitoring structure obviously leads to duplication of efforts and a waste of time and resources. Armendáriz De Aghion (1999) suggests another model called the rotating pyramid structure. According to this structure, in each period a different member at the top of the pyramid monitors his peers at the bottom of the pyramid. Rotating monitoring avoids duplication of efforts by members and minimizes monitoring costs.

The group structure that seems to work in the Eritrean group-based lending programs may be just one of many alternatives. We recommend further theoretical and empirical research in this direction, as we believe that it would improve the understanding of the monitoring mechanism in group-based lending programs. Closely related to this, we would like to recommend that new models are developed, in which delegated monitoring theory is incorporated. Delegated monitoring in this context means that lending institutions, rather than using a mutual monitoring structure, introduce mechanisms in which the monitoring function is

delegated to an individual. The delegate can be a village chief, a village administrator, a locally stationed loan promoter, etc.[1] The group structure in Eritrea appears to have clear similarities with such a delegated monitoring structure.

Apart from further investigating the theoretical implications of the group structure we have seen in Eritrea, we may consider a number of other issues that may be studied in the future. First, we have to investigate whether the difference in the impact of monitoring and social ties of group leaders vis-à-vis other group members on moral hazard and repayment performance of groups is also found elsewhere, i.e. in group-based lending programs outside Eritrea. Second, we need to elaborate on the theoretical foundation explaining why an individual wants to become a group leader, given the fact that this position may be quite burdensome and responsible, and given the fact that other group members may try to free-ride on the monitoring efforts of the group leader. Third, further research is needed on how group leaders in Eritrean credit programs are chosen and why some individuals are willing to take up the burdensome tasks of being a group leader.

9.2.3 Adverse selection, risk behavior and group formation

The aim of chapter 8 has been to provide new insights into the empirical relevance of the homogeneous matching hypothesis in theoretical models of group-based lending. These models can be categorized into two groups. A first group of papers claims that groups match homogeneously in risk, which means safe borrowers match with safe borrowers and risky borrowers with risky ones. Thus, homogenous matching allows the lender to identify different groups on the basis of their risk level. This permits lending programs to mitigate adverse selection problem.

Alternatively, some papers have demonstrated that groups match heterogeneously in risk, which leads to risk pooling (Sadoulet, 1999). This group of papers challenges the homogenous matching theory and

[1] For similar studies see Warning and Sadoulet (1998) and Fuentes (1996).

illustrates that heterogeneous matching emerges as a rational response to the lack of insurance markets. Sadoulet and Carpenter (2001) confirm the heterogeneous matching theory in an empirical study on group-lending schemes in Guatemala.

An important part of the methodology we have used in our analysis in chapter 8 to test for homogeneous matching consists of estimating risk behavior of borrowers of the Eritrean MFIs. Our estimates suggest that among borrowers from the microfinance programs in Eritrea there is a non-linear relationship between income and risk taking. Below a certain threshold level of income an increase in income will lead to less risky behavior, whereas an increase in income will increase risk taking above the threshold level. We also find that group leaders take more chances than regular group members, that better educated borrowers take more chances, and that those borrowers who have had repayment problems in the past will take more chances. Moreover, we find evidence that borrowers in larger groups will take more chances than borrowers in smaller groups.

With respect to the homogeneous matching hypothesis, which states that group-based lending leads to homogenous matching among group members and consequently permits lenders to mitigate the adverse selection problem, our results strongly indicate that groups are formed heterogeneously in risk. Most importantly, we do not find support for the matching frictions hypothesis, in the sense that even if we control for matching frictions, credit groups in Eritrea do not seem to consist of borrowers of a similar risk type. This finding suggests that the commonly held assumption of homogeneous matching of groups in group-based lending cannot be confirmed for the case of Eritrea. Therefore, based on the results we have found we suggest that theoretical models that explain the homogenous matching hypothesis should be reconsidered and adjusted.

Given that our results show that groups in Eritrea are formed heterogeneously, an important issue then is to examine why this is so. A possible reason brought forward in some recent papers is that risky and

safe borrowers may provide insurance to each other. Members of heterogeneous group can help each other by transferring the safe borrowers' lower absolute risk to risky partners in exchange for a payment. Sadoulet and Carpenter (2001) observe that risky members make regular weekly payments of a certain sum to safe group members. In exchange for this payment, safe members agree to cover for the risky members if they fail to repay their weekly repayments during bad business weeks.

The models behind the homogeneous matching hypothesis assume that borrowers are risk neutral and that project returns do not covary. This implies that in these models there is no possibility to gain from economies of risk pooling. However, if borrowers are risk averse and project returns are not independent, then a borrower may gain by grouping with another borrower if the project returns of the two borrowers are negatively correlated. This may then imply that heterogeneous matching is the optimal outcome. Thus, further research of homogeneous versus heterogeneous matching should be aimed at developing new theoretical models with risk aversion rather than risk neutrality. Finally, further research is needed to see whether our results with respect to homogenous versus heterogeneous matching can also be found in MFIs in other contexts and countries.

9. 3 Limitations of the econometric analyses

In chapters 6, 7 and 8 we have used various econometric techniques to examine whether theoretical models explaining how group-based lending mitigates asymmetric information problems can be supported by empirical evidence. In this section we discuss the limitations of the econometric analysis presented in this thesis. In particular, we focus on the following problems:

- Endogeneity problems and measurement errors
- Problems of low variability in the data
- Omitted and irrelevant variables
- Stability of the results

9.3.1. Endogeneity problems and measurement errors

A crucial assumption in the basic regression model is that the right–hand–side variables are independent of the error term. However, this assumption may be violated if the right–hand–side variables are endogenous or measured with error. The regression analyses presented in chapters 6, 7 and 8 may suffer from this.

Endogeneity between two or more variables arises when these variables are mutually or simultaneously determined. For instance, in the income determination model consumption and income are both determined by the interaction between the consumption function and income identity. Ignoring such simultaneous effects causes the presence of correlation between the regressors and the error terms, thereby resulting in inconsistent and biased estimators and thus violating assumptions underlying the basic regression model. This also holds for the logit models we have used in our empirical applications in this thesis.

We acknowledge that the ways we have set up some of our empirical models are partially problematic, since some of the right–hand–side variables may be endogenous, which may bias the estimation results. For example, in chapter 6 we investigate which variables influence the repayment performance of groups. We use a logit model to estimate the effects of independent variables in reducing the incidence of repayment problems. These independent variables are grouped into measures of peer screening and group formation, peer monitoring, social ties, and peer pressure and other control variables. Yet, group formation (the group selection process) and group monitoring may be endogenous variables. Using these variables without accounting for endogeneity may lead to erroneous conclusions about their impact on repayment performance of groups.

In chapter 7 we investigate whether peer monitoring and social ties play a role in mitigating moral hazard problems in the context of the two Eritrean group-based lending programs. The dependent variable in the analysis is a dummy variable that measures the occurrence of moral

hazard behavior within a group. We use a logit model to estimate the effects of a number of independent variables measuring social ties and peer monitoring within groups in reducing moral hazard behavior of group members. Again, however, social ties and monitoring may be endogenous variables and using these variables without accounting for endogeneity may bias the outcomes of the regression analysis.

Chapter 8 we empirically test whether groups match homogeneously or heterogeneously in risk. We estimate the relationship between individual risk and level of risk heterogeneity in the individual groups. Likewise, here also, there may endogeneity of group formation, group characteristics and borrowers' choice of project risk.

Another econometric problem we are faced with is that several variables in our analyses may be measured with error. Measurement errors may particularly occur in case of constructed variables, such as the proxies for risk and heterogeneity we have used in Chapter 8. Constructed variables are almost by definition measured incorrectly or measured with error. Variables that are measured with error may cause correlation between the right–hand–side variables and the error terms. This means that when we use variables that are measured with error in estimating a relationship, the values of these variables differ from the correct values and this may cause serious estimation problems.

To illustrate our previous discussion, let us assume that the true regression model is presented by:

$$Y_i = \beta X_i + \varepsilon_i \qquad (1)$$

Assume that X_i is replaced by X_i^* in which $X_i = X_i^* + v_i$, where X_i is the true value and X_i^* is the observed value therefore the actual regression run is:

$$Y_i = \beta X_i^* + (\varepsilon_i - \beta v_i) = \beta X_i^* + \varepsilon_i^* \qquad (2)$$

In this case the error term ε^* and the independent variable X^* are correlated (have a non-zero covariance), in particular:

$$Cov\ (\varepsilon_i^*, X_i^*) = -\beta\sigma^2_{vi} \qquad (3)$$

Thus the regression parameters will be biased and inconsistent as a result of the measurement error in the independent variable.

The most popular way to get around endogeneity problems, as well as problems caused by measurement errors in the right–hand–side variables is the use of instrumental variables and/or instrumental variables regression techniques, such as for instance GMM.

The method of instrumental variables involves the search for a new variable that is both highly correlated with the independent variable X and at the same time uncorrelated with the error term in the equation. The instrumental variable estimation technique thus controls for the fact that the explanatory variables are likely to be correlated with the error term and in this way deals with possible endogeneity problems.

However, the use of instrumental variables is not without problems. Very often it is difficult to find instruments that are uncorrelated with the error term and at the same time highly correlated with the relevant endogenous variable. In many cases, variables that are potentially available to be used as instruments are in fact performing poorly in reducing endogeneity problems. There is a voluminous literature that argues that one should be extremely careful in using instrumental variables. It is, for instance, well-known that if the correlation between the instruments and the endogenous variable is low, this instrumental variable estimator is inconsistent. It is also known that in finite samples instrumental variable estimators are biased in the same direction as the OLS estimators. This all implies that it is not unlikely, especially in situations where it is very difficult to find the right instruments, that the cure is worse than the disease.

Notwithstanding these problems related to the instrumental variables method, we should still care about the endogeneity and measurement

problems in our study. Yet, the most important limitation of the current version of the dataset with respect to handling the endogeneity and measurement problems is that it is not rich enough to successfully use the instrumental variables method. This means that one of the most important areas for further research on group-based lending in Eritrea is the improvement of the dataset, including the development of good instruments. One obvious extension of our data is to redo the questionnaire. This will allow us to construct a panel dataset. Right now, the dataset is cross-sectional, without any time-series information. With time-series information about the main variables in the analysis we may reduce endogeneity problems by using lagged, instead of contemporaneous right–hand–side variables. This also allows us to use lagged endogenous variables as instruments. As is known from the literature, under certain conditions, lagged levels can be used as instruments for the contemporaneous differences and lagged differences as instruments for the contemporaneous levels.

To conclude the discussion on problems of endogeneity and measurement errors: we realize that these problems may bias our empirical results. Ideally, therefore, we should have corrected the estimations by using instrumental variables. Given the current dataset this is not possible, however. Future research should aim at enriching the information about group lending in Eritrea in such a way that useful instruments for variables such as group formation and monitoring are included. At this stage of the research, the only thing we can do is to clearly express that our results must be interpreted with care, given the econometric problems described above.

9.3.2 Omitted and irrelevant variables

Another problem our estimates may suffer from is that some relevant variables are not included in the regressions and that some irrelevant variables are included.

Even with sound economic principles and logic, it is possible that in our models important variables are omitted and/or irrelevant variables are

included. To introduce the omitted variable problem in the context of our studies, suppose for instance that the repayment problems (*RP*) of a group member in group based lending program depends his income (*I*), amount of credit (*A*) allotted to him, and his creditworthiness (*W*), such that we can write the model as follows:

$$RP = \alpha_1 + \alpha_2 I_t + \alpha_3 A_t + \alpha_4 W_t + e_t \quad (4)$$

However, suppose that data on creditworthiness of a candidate are not easily available, so instead, we may estimate the model:

$$RP = \alpha_1 + \alpha_2 I_t + \alpha_3 A_t + e_t \quad (5)$$

By estimating (5) we are imposing the restricting $\alpha_4 = 0$ when it is not true. The logit estimator for α_1 and α_2 will generally be biased, although it will have lower variance. It may not be biased is if the omitted variable (W_t) is uncorrelated with the included variables (I_t, and A_t). However, uncorrelated explanatory variables are rare.

Thus, in order to avoid the omitted-variables bias one should include all relevant variables even if one is interested only in the impact of one of the individual regressors on the dependent variable. It also means that, if an estimated equation has coefficients with unexpected signs, or unrealistic magnitudes, a possible cause of this strange result is the omission of an important variable.

Similarly, if we add an irrelevant variable to an equation we will end up inflating the variances of the estimates. Suppose the correct specification is the above equation (4):

$$RP = \alpha_1 + \alpha_2 I_t + \alpha_3 A_t + \alpha_4 W_t + e_t \quad (6)$$

but we estimate the model:

$$RP = \alpha_1 + \alpha_2 I_t + \alpha_3 A_t + \alpha_4 W_t + \alpha_5 H + e_t \quad (7)$$

where H is height of a group member, where $\alpha_5 = 0$. Thus, H is an irrelevant variable. The inclusion of an irrelevant variable does not make the estimator biased, but the variances of α_1, α_2, α_3 and α_4 will be greater than those obtained by estimating the correct model. The variances of α_1, α_2, α_3 and α_4 will not be exaggerated if the H is not correlated with the other explanatory variables.

One method for assessing whether a variable or a group of variables should be included in an equation or not, is to perform significant tests, such as the t-test or F-test. However, there are two possible reasons for a test outcome not to reject a zero null hypothesis:

- The corresponding variables have no influence on the dependent variable and can be excluded from the model.
- The corresponding variables are important ones for inclusion in the model, but the data are not sufficiently good to reject H_0.

It is possible for a relevant variable to have a zero estimate in a particular sample, for example because of excessive multicollinearity or due to unfortunate sampling. Similarly, an irrelevant variable may have a non-zero slope estimate in a particular regression. It is only under conditions of repeated sampling that an irrelevant variable yields coefficient estimates that, on average, are equal to zero.

To conclude the discussion on omitted and irrelevant variables, a caveat of our analysis may be that we have not included all relevant variables in our models and that this affects our estimates. For instance we do not have information in our data on group members' creditworthiness before the formation of the group. This is because most of the time it is difficult to get such information from informal credit sources on which members were dependent before joining group-based lending programs.

9.3.3 Problems of low variability in the data

A next problem with respect to the empirical analyses in this thesis is that of the low variability of the variables in our dataset. Some of the binary variables in our dataset have means close to one or zero. This seems to be common in datasets with a lot of binary variables. The low variability of these binary variables implies that the sample variation for these variables arises from just a few observations. This may affect the reliability of the results. As already indicated in chapter 6, because of problems multicollinearity and lack of variation of some of these variables we decided not to use these variables in the empirical analysis. Instead, based on extensive data analysis (the results of which are reported in the appendix tables of Chapter 6) we carefully selected a sub-set of variables from the dataset for our empirical studies. Nevertheless, we admit that there may still exist some problems related to the low variability of some variables used in the empirical analysis.

9.3.4 Stability of the results

Finally, our empirical investigations may suffer from problems related to the stability of the results. In order to test the stability of the results we estimated several different specifications of the models in all our empirical chapters. The econometric approach we followed to test the stability of our results is known as the general-to-specific approach. Another way of approaching the econometric modeling is to take the specific-to-general (bottom-up) approach, which starts from a small model, including only theoretically correct variables and then test various specifications of this smaller model. There is on going discussion about which of these two approaches is preferred (Brooks, 2002). One of the advantages of the approach we have taken is "that the statistical consequences from excluding relevant variables are usually considered more serious that those from including irrelevant variables" (Brooks, 2002, pp.209-210). Nevertheless, the data set we have is not rich enough to allow us to do further stability tests. We hope that in the future, when a new data set may be available, further stability tests will be possible.

9.3.5 Concluding remarks

The discussion of the potential econometric problems with the results we presented in Chapters 6, 7 and 8 has made one thing clear: in order to obtain stronger and more convincing answers to questions concerning how group-based lending mitigates asymmetric information problems, we need to solve these problems and one important way forward to accomplish this is to enrich our dataset. Perhaps the most serious econometric problem we have to cope with in future research is the endogeneity problem. As was suggested in section 9.3.1, one obvious extension of our dataset is by redoing the questionnaire so that we are able to create a small panel dataset. This would allow us to use lagged variables as instruments. Another important extension of the dataset would be to include questions in the questionnaire that provide information on variables that can be used as instruments in the estimations, next to the lagged variables in the regression models.

The theme of our study is a relatively new area on which there is very little empirical evidence. Therefore, we strongly believe that this area deserves further research. We have gained some experience from this endeavor and we have the intention to do further research, taking similar issues on how group-based lending programs work in other countries. At this juncture we invite also others to show interest in this area and make relevant studies, which could enrich our knowledge on group-based lending mechanism in developing countries.

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Questionnaire details

Questionnaire

Serial number:
Interviewer:

Name of the lending program:
Name of interviewee:
Name of the group:

Date:

Zone:
Sub-Zone:
Administration:
Village (town):
Additional details:

A Socio-economic indicators

A-1. Gender

1 Male
2 Female

A-2. Age

…

A-3. Marital status

1 Single
2 Married
3 Divorced
4 Widowed

A-4. Socio-cultural group

1 Muslim
2 Christian
3 Other

A-5. What is the level of your education?

1 Illiterate
2 Primary school
3 Junior secondary school
4 Secondary school
5 University

A-6. What is your principal (main) occupation?

1 Farming
2 Day laborer
3 Services
4 Trading (hawking)
5 Manufacturing

A-7. What is your monthly income?

…

B. Credit and savings

B-1. Do you have other sources of credit?

1 Yes
2 No

If the answer to question B-1 is *no*, please move on to question B-3.

B-2. Which of the following are your sources?

1 Local traders/suppliers
2 Moneylenders
3 Banks
4 Relatives/friends
5 Other

B-3. Has any bank or some other lending institution ever refused you a loan?

1 Yes
2 No
3 Never applied

If the answer to B-2 and B-3 is *no*, please move on to question B-6.

B-4. Where you partly or fully refused?

1 Partly
2 Fully

B-5. What was the reason for refusal?

1 Lack of collateral
2 No consignor
3 Do not know
4 Other reasons

B-6. What size are the loans you got from the program during the last and the present loan cycle?

Last loan cycle …

Present loan cycle …

B-7. What is the monthly install payment?

…

B-8. How much of your install payment do you save before the last week of your monthly repayment?

…

B-9. What for have you acquired the loan?

1 Trading purposes

2 To buy sheep/ goats

3 To buy oxen/cows

4 To buy raw materials

5 To buy equipments

6 Other

B-10. Have you had problems repaying your debt in the current loan cycle?

1 Yes

2 No

If the answer to B-10 is *no*, please move on to question B-14.

B-11. How many times did this happen and how much money was involved?

Times

Amount per time

B-12. What were the reasons for your problems?

1 Natural disaster
2 Profit loss
3 Illness of family member
4 Death of family member
5 Competition was tough

B-13. If you got help from your group members, how many of them helped you?

1 One group member
2 Two group members
3 Entire group

B-14. How do you value future (subsequent) access of a loan from the lending program?

1 Very high
2 High
3 Moderate
4 Little
5 Not at all

Questions B-15 to B-21 are posed to group leaders only.

B-15. How many times has your group received a loan from the program?

…

B-17. Are there any group members who have had problems repaying their loan in the current loan cycle?

1 Yes
2 No

If the answer to question B-17 is *no*, please move on to question B-19.

B-18. Who are these members, how many times did they fail to repay and what was the amount of money involved?

1 name …
number of times …
amount …
2 name …
number of times …
amount …

B-19. Has there been another group in your village or in the area that has had repayment problems?

1 Yes
2 No

B-20. Does your group have a saving scheme?

1 Yes
2 No

If your answer to question B-20 is *no*, please move on to B-22.

B-21. Specify the type(s) of scheme.

1 Compulsory only
2 Voluntary only

B-22. What is the total value of your group's savings?

…

C. Group formation and social ties

C-1. How long have you lived in this village/town?

1 I was born here

2 I have lived here since … (number of years)

C-2. Have you ever participated in another group?

1 Yes

2 No

C-3. How well did you know the members before you formed this group?

1 Name: good/hardly/not al all

2 Name: good/hardly/not at all

If the answer to question C-3 is *good*, please move on to C-5.

C-4. If you did not know your fellow group member very well or did not know him/her at all, why did you accept him/her as a member in the group?

1 He/she is a friend of another member

2 He/she is (he is) an acquaintance of another member

3 His/her business looks good

4 He/she is a relative of another member

5 Other

Questions C-5 to C-7 are posed to group leaders only.

C-5. Who initiated the group formation?

1 Members themselves

2 VB officials

3 Credit officer

4 Other

C-6. How many members does your group have?

…

C-7. What is the gender of the group members?

1 Female:

2 Male:

D. Screening

D-1. Did you know about the behavioral integrity of all potential group members before the formation of your group?

1 Yes
2 No

If your answer to question D-1 is *yes*, please go to D-5.

D-2. If the answer for D-1 is *no*, do you then screen them before forming the group?

1 Yes
2 No

D-3. If your answer to question D-2 is *yes*, whom do you ask for more information?

1 Neighbors
2 Friends
3 Relatives
4 Money lenders
5 Merchants
6 Other

D-4. If your answer to question D-2 is *yes*, what information do you seek from the above individuals?

1 What does he/she do for a living?
2 How is his/her business (farm) doing?
3 Is he/she is creditworthy?
4 Is he/she a hard worker?
5 Does he/she have any assets or liabilities?
6 Is he/she a nice person?
7 Other

Questions D-5 to D-6 are posed to group leaders only.

D-5. Do you have internal group agreements and rules of conduct?

1 Yes

2 No

If your answer to question D-5 is *no*, please go to E-1.

D-6. What kind of rules?

1 Written

2 Verbal

E. Monitoring

E-1.What is the average distance between your homestead (business) and that of the other group members?

… meters

E-2. Do you know what the economic activities of other group members are?

1 Yes
2 No

E-3. Did you know for what purpose the other group members acquired their current loans?

1 Yes
2 No

If your answer to question E-3 is *no*, please move on to E-5.

E-4. What did they buy with the loan?

1 Oxen/cows
2 Goats/sheep
3 Raw materials
4 Equipment
5 Supplies
6 Other

E-5. Do you know monthly sales of other group members?

1 Yes
2 No

E-6. Do you visit each other at the business or at home regularly?

1 Yes
2 No

If your answer to question E-6 is *no*, please move to E-8.

E-7. How often do you visit each other?

1 Daily
2 Once a week
3 Every fortnight
4 One a month
5 Other

E-8. How often does the group meet?

1 Once a week
2 Every fortnight
3 One a month

Questions E-9 to E-11 are posed to group leaders only.

E-9. Does a credit officer visit your group?

1 Yes
2 No

If your answer to question E-10 is *no*, please move to E-11.

E-10. How often does the credit officer visit you?

1 Once a week
2 Every fortnight
3 One a month
4 One every three months

E-11. Has any one member of your group ever misused (abused) loans?

1 Yes
2 No

F. Leadership

This question is posed to regular group members only (members other than the group leader).

F-1. How do you think the group leader is carrying his responsibility as a leader?

1 Good
2 Same as the others
3 Bad/not efficient

G. Enforcement

G-1. Why do you repay your loans?

1 Because you want to stay on good terms with the group
2 Because you want to fulfill your moral obligation towards the group
3 Because you highly value future access to loans from the program
4 Because you want to settle your debt

G-2. What form of pressure would/does your group use against defaulting member to repay his/her dues?

1 Moral persuasion
2 Village gossip
3 Hassling
4 Exclusion from social activities
5 None

G-3. How would/do you feel if a group member defaults?

1 Very angry
2 Neutral
3 Sympathetic

G-4. What form of penalty would the group impose against a defaulting member?

1 He/she will be denied subsequent loans
2 He/she will have to leave the group
3 He/she will be reported to the village leaders or administrators
4 He/she will be reported to the credit officer
5 He/she will loose his/her assets

G-5. Are you yourselves always prepared to sanction a member with repayment problems?

1 Yes
2 No

G-6. If your answer to H-5 is *no* do you feel applying sanctions to defaulting members difficult?

1 Yes

2 No

H. Infrastructure

J -1. What is the distance between your village or town and the following?

1 Clinic	… km
2 Asphalted road	… km
3 Post office	… km
4 Market	… km
5 Regional administration office	… km
6 Bank	… km

Samenvatting

Toegang tot krediet is een belangrijke voorwaarde voor ontwikkeling. Deze stellingname wordt tegenwoordig door de meeste ontwikkelingseconomen onderschreven. Het ontbreken van toegang tot krediet en kredietmarkten wordt beschouwd als één van de hoofdoorzaken voor de voortdurende armoede waarin grote delen van de bevolking in ontwikkelingslanden zich bevinden. Er zijn verschillende oorzaken voor het feit dat de allerarmsten vaak niet over krediet kunnen beschikken. Om te beginnen is kredietverlening aan deze groepen voor banken meestal niet aantrekkelijk vanwege de geringe omvang van de leningen in combinatie met de hoge, vaste kosten van het inwinnen van de benodigde informatie met betrekking tot de kredietwaardigheid van potentiële leners. Daarnaast wordt kredietverlening aan de allerarmsten als extra risicovol gezien vanwege de activiteiten die zij uitvoeren en omdat zij minder mogelijkheden hebben om hun inkomsten over meerdere activiteiten te spreiden. Bovendien hebben zij over het algemeen niet de beschikking over waardevolle bezittingen die als onderpand voor een lening kunnen worden gebruikt. Tenslotte zijn in de meeste ontwikkelingslanden de financiële markten en producten onderontwikkeld of zelfs helemaal afwezig. Vooral de allerarmsten worden hierdoor getroffen: er zijn nauwelijks of geen financiële instellingen die hen krediet kunnen of willen verschaffen.

De erkenning van het feit dat armoede en het ontbreken van toegang tot kredietmarkten in ontwikkelingslanden nauw met elkaar zijn verbonden heeft wetenschappers en beleidsmakers gestimuleerd na te denken over mogelijke oplossingen voor dit probleem. Dit heeft geleid tot de ontwikkeling van zogenaamde microkredietinstellingen (MKIs). MKIs verschaffen krediet aan lage-inkomensgroepen, die niet in staat zijn geld te lenen bij de reguliere financiële instellingen. De bekendste voorbeelden van MKIs zijn de Grameen Bank in Bangladesh, de BancoSol in Bolivia en de Bank Kredit Desa in Indonesië.

Globaal beschouwd kunnen MKIs op twee verschillende manieren krediet verschaffen: in de vorm van een lening aan een individu en in de vorm van een lening aan een groep van individuen, ook wel groepsleningen genoemd. In geval van een groepslening zijn de leden van de groep gezamenlijk verantwoordelijk voor de terugbetaling van de lening. Dit wordt in de literatuur aangeduid met de term *joint liability*. Indien de groepslening niet wordt terugbetaald krijgt de groep geen nieuwe lening meer.

De belangrijkste kenmerken van groepsleningen kunnen als volgt worden beschreven. In de meeste gevallen selecteren groepen zichzelf en doen zij vervolgens een aanvraag voor een groepslening. De leden van een groep zijn in de meeste gevallen woonachtig in hetzelfde dorp of gemeenschap en kennen elkaar hierdoor goed. In de literatuur spreekt met in zo'n geval van het bestaan van sterke sociale banden (*social ties*). Dit leidt ertoe dat de groepsleden veel informatie over elkaar zullen hebben, wat hen in staat stelt om te beoordelen of een individu kredietwaardig is, of zijn project kans van slagen heeft en wat de redenen zijn voor het niet kunnen terugbetalen van een lening indien dit zich voordoet. Daarnaast kan binnen de groep gebruik worden gemaakt van sociale druk om eventuele wanbetalers aan te zetten tot terugbetaling van de lening en kunnen groepsleden besluiten om in geval van wanbetaling van een individu de terugbetaling gezamenlijk voor hun rekening te nemen.

In de economische literatuur is veel aandacht voor de werking van groepsleningen. Het gaat daarbij vooral om theoretische modellen die beschrijven hoe groepsleningen de traditionele problemen van asymmetrische informatie (zoals adverse selection, moral hazard en de afdwingbaarheid van kredietcontracten) waarmee kredietverleners worden geconfronteerd, kunnen verminderen.

De meeste modellen concluderen dat, juist omdat in geval van een groepslening de leden van de groep gezamenlijk verantwoordelijk zijn voor de terugbetaling van de lening, en omdat de groep geen nieuwe lening meer krijgt indien de groepslening niet wordt terugbetaald, de informatieproblemen van de kredietverlener kunnen worden verminderd.

Ten eerste worden groepsleden hierdoor namelijk gestimuleerd om, voordat de lening wordt verstrekt, elkaars kredietwaardigheid zorgvuldig te beoordelen (aangeduid met *screening*). Bovendien geeft het de leden een stimulans om, nadat het krediet is verstrekt, na te gaan waarvoor het krediet wordt gebruikt en in actie te komen wanneer terugbetaling in gevaar dreigt te komen (aangeduid met *monitoring* en *enforcement*). Door de screening die plaatsvindt voordat een groep zichzelf formeert worden problemen van *adverse selection* verminderd. Daarnaast reduceert de monitoring door de leden de kans op *moral hazard* gedrag. Ten slotte vergroten de sterke sociale banden de mogelijkheid van een groep om terugbetaling af te dwingen, waarmee de afdwingbaarheid van het contract wordt verbeterd.

Hoewel er dus op het gebied van de theorie de nodige inzichten zijn met betrekking tot de werking van groepsleningen, is er relatief weinig empirisch onderzoek voor handen, waarin de voorspellingen en uitspraken van de modellen systematisch worden getoetst. Dit heeft althans ten dele te maken met het feit dat het buitengewoon lastig is om betrouwbare informatie te verzamelen over de werking van groepsleningen, waarmee de modellen kunnen worden getoetst.

Het onderzoek in dit proefschrift draagt bij aan de empirische literatuur over de werking van groepsleningen. Daarbij ligt de nadruk enerzijds op het bestuderen van de verschillende rollen die individuele groepsleden kunnen spelen bij het screenen en monitoren en bij het afdwingen van de terugbetaling van de lening. Is er in dit verband een verschil tussen de groepsleider en de overige groepsleden? Anderzijds wordt bestudeerd hoe de samenstelling van de groepen totstandkomt. Hoe kiezen individuen hun groepsleden? Welke factoren liggen ten grondslag aan de keuzes die worden gemaakt en waarom is dat zo? Voor het onderzoek wordt gebruik gemaakt van een omvangrijke vragenlijst die in 2000 is gebruikt om twee MKIs in Eritrea te bestuderen.

De analyse in dit proefschrift vangt aan met een overzicht van de bestaande literatuur op het gebied van microkrediet en MKIs (hoofdstuk 2). Allereerst worden de problemen van asymmetrische informatie in

financiële markten behandeld. Vervolgens wordt uiteengezet hoe MKIs kunnen bijdragen tot het verminderen van deze problemen voor de kredietverschaffers en welke beperkingen MKIs daarbij kennen. Hierna worden de twee belangrijkste vormen van microkrediet behandeld, te weten groepsleningen en individuele leningen. Ook wordt een korte beschrijving gegeven van de kenmerken van de bekendste MKIs, zoals de Grameen Bank, BancoSol en Bank Kredit Desa. Wellicht één van de belangrijkste conclusies van dit hoofdstuk is dat volgens een recent onderzoek instellingen die groepsleningen verschaffen verreweg de belangrijkste groep van MKIs vormen, althans wat betreft het aantal kredietnemers die zij bedienen in ontwikkelingslanden. Daarmee is tevens het belang aangegeven van het verdiepen van het empirisch onderzoek naar de werking van dit type krediet voor de allerarmsten in deze landen.

In hoofdstuk 3 wordt het financiële systeem beschreven van Eritrea, het land waar de MKIs die in deze studie worden bestudeerd zich bevinden. Deze beschrijving maakt duidelijk dat het financiële systeem van Eritrea onderontwikkeld is, zelfs wanneer men het vergelijkt met systemen van andere Afrikaanse landen. Het land kent, naast de centrale bank, slechts drie bancaire instellingen. Daarvan is de Commercial Bank of Eritrea verreweg de belangrijkste met een marktaandeel van meer dan 90 procent van alle deposito's die bij banken worden aangehouden en 80 procent van alle leningen die door het bankwezen aan particulieren zijn verstrekt. Nadere analyse van de werking van het bancaire systeem leert dat banken niet of nauwelijks leningen verstrekken aan kleinschalige projecten en aan individuen die in de zogenaamde informele sector werkzaam zijn, vanwege het hoge risico dat het lenen aan dit soort kredietnemers volgens de banken met zich meebrengt. Dergelijke projecten zijn derhalve aangewezen op informele kredietinstellingen. De kosten van informeel krediet zijn echter in de regel nogal hoog. De conclusie van hoofdstuk 3 luidt dan ook dat het huidige financiële systeem van Eritrea nauwelijks in staat is om de potentiële groeimogelijkheden van met name de lage-inkomensgroepen te ondersteunen en dat er derhalve behoefte is aan alternatieve financiële producten die deze inkomensgroepen wel kunnen en willen bedienen.

Vanaf het midden van de jaren negentig heeft de Eritrese overheid in samenwerking met de Wereldbank en westerse donoren initiatieven ontwikkeld om MKIs op te zetten die zich moesten toeleggen op het verschaffen van krediet aan deze inkomensgroepen. Deze initiatieven hebben geresulteerd in het ontstaan van twee MKIs, te weten het *Southern Zone Saving and Credit Scheme* (SZSCS) in 1994 en het *Saving and Micro Credit Program* (SMCP) in 1996.

Beide programma's zijn opgezet naar het voorbeeld van de Grameen Bank in Bangladesh en vestrekken groepsleningen volgens het al eerder genoemde principe van *joint liability*. De kenmerken van beide programma's worden gedetailleerd beschreven in hoofdstuk 4 van dit proefschrift. Daarbij springen een aantal kenmerken in het oog. Zo verstrekken beide programma's leningen van geringe omvang aan kleine groepen variërend van 3 tot 7 deelnemers, zijn de kredietnemers vrijwel uitsluitend woonachtig in rurale gebieden, en wordt de cliëntele van de programma's op grond van de officiële statistieken gerekend tot het armste deel van de bevolking. Voorts maken beide programma's gebruik van een systeem van progressieve leningen, dat wil zeggen dat groepen die een lening hebben terugbetaald, in de volgende leenronde een groter bedrag kunnen lenen. Leningen hebben over het algemeen een looptijd van een jaar en betalingen van rente en aflossing vinden steeds plaats op maandelijkse basis.

Speciale aandacht in het onderzoek gaat uit naar de opzet en organisatie van de groepen die de lening ontvangen. Bij het samenstellen van de groepen zijn individuen vrij te kiezen met wie zij een groep wensen te vormen. Daarbij geldt als beperking dat groepsleden geen directe familierelatie mogen hebben. Nadat de groep is geformeerd kiezen de leden uit hun midden een groepsleider. Deze groepsleider fungeert als tussenpersoon tussen de groep en organisatie van de MKI. Hij/zij brengt de organisatie op de hoogte van de ontwikkelingen binnen de groep die van belang zijn voor de terugbetaling van het krediet. Hij/zij zorgt daarnaast voor de maandelijkse betaling van de rente plus aflossing aan de organisatie. Ook kan hij/zij besluiten tot een vergadering van de groep om belangrijke zaken betreffende het groepsproces te bespreken. Het is deze

rol van de groepsleider die in twee van de drie empirische analyses in dit proefschrift centraal staat (zie hieronder).

In hoofdstuk 5 wordt een uitgebreide beschrijving van de dataset gegeven die ten grondslag ligt aan de empirische analyses van de werking van beide MKIs in Eritrea. De data zijn verkregen op basis van een uitgebreide vragenlijst die in het jaar 2000 is afgenomen onder 351 deelnemers aan de twee MKIs. Hiervan participeren 167 in het SZSCS programma, de overige 184 zijn deelnemers aan het SMCP programma. De totale groep geïnterviewden is verspreid over 102 groepen; daarvan zijn 46 groepen gerelateerd aan SMCP en 56 aan SZSCS. Per groep worden steeds de groepsleider en één of meerdere andere groepsleden geïnterviewd.

Veel aandacht wordt voorts besteed aan de bespreking van de vragen die informatie bevatten over processen van screening, monitoring en afdwingbaarheid van terugbetalingen. De variabelen die deze processen weerspiegelen vormen de kern van de analyses in de latere hoofdstukken in dit proefschrift. De opzet van de vragenlijst biedt de mogelijkheid variabelen te construeren die activiteiten betreffende screening, monitoring en het afdwingen van terugbetalingen per individu beschrijven. Zoals hieronder zal blijken is dit onderscheid van cruciaal belang voor de empirische analyses in dit proefschrift.

Ten slotte worden in dit hoofdstuk de beperkingen van de dataset belicht. Hoewel de vragenlijst en de daaraan ontleende variabelen unieke informatie bevatten over hoe processen van screening, monitoring en het afdwingen van terugbetalingen in groepen in Eritrea, wordt tegelijkertijd erkend dat datamateriaal, dat verkregen is op basis van vragenlijsten als die in dit onderzoek is gebruikt, met enige terughoudendheid moet worden beschouwd. Om te beginnen bestaat altijd het risico dat respondenten incorrecte of onvolledige informatie verschaffen. Daarnaast kan het lage opleidingsniveau van de meeste respondenten de betrouwbaarheid van de antwoorden verminderen. Een ander potentieel probleem is dat vele variabelen die afgeleid zijn van de vragen binaire (0,1) variabelen zijn. In een aantal gevallen is de variabiliteit van deze variabelen gering,

waardoor zij feitelijk niet geschikt zijn voor gebruik in empirische analyses. In het onderzoek is steeds al het mogelijke gedaan om de invloed van deze problemen op de resultaten van de empirische analyses zoveel mogelijk te beperken. Desalniettemin wordt erkend dat, gegeven bovengenoemde problemen, de gepresenteerde resultaten in dit proefschrift met de nodige voorzichtigheid dienen te worden beoordeeld.

In hoofdstuk 6 wordt een empirische analyse uitgevoerd waarin de determinanten van terugbetaling door groepen worden bestudeerd. Volgens de theorie dragen processen van screening en monitoring en het afdwingen van terugbetaling binnen groepen in positieve zin bij tot een verhoogde kans op terugbetaling van de groepslening aan de MKI. Daarmee worden de informatieproblemen van de MKI feitelijk verminderd. Vraag is evenwel of dit zo is, en zo ja, hoe dit dan precies werkt. Eerdere studies hebben aangetoond dat groepsleningen door middel van screening, monitoring en het afdwingen van terugbetaling binnen groepen inderdaad leiden tot een verhoogde kans op terugbetaling.

De studie in dit proefschrift draagt bij tot een verdere verdieping van de inzichten van voorgaande studies door in meer detail te bestuderen hoe het groepsproces precies werkt en hoe het bijdraagt tot terugbetaling van de lening. Daarbij wordt bestudeerd in hoeverre het effect van screening, monitoring en het afdwingen van terugbetaling door de groepsleider op de terugbetaling van de groepslening anders is dan indien deze activiteiten worden uitgevoerd door andere groepsleden. In hoofdstuk 4 werd al opgemerkt dat, althans in het geval van de MKIs in Eritrea, de groepsleider een bijzondere rol speelt als intermediair tussen de groep en de organisatie van de MKI. Deze bijzondere rol kan gevolgen hebben voor de effectiviteit van screening en monitoring en het afdwingen van betalingen door groepsleden. De opzet van de vragenlijst biedt de mogelijkheid om deze activiteiten op het niveau van het individu te bestuderen.

De resultaten van de analyse in hoofdstuk 6 laten zien dat het effect van screening en monitoring en het afdwingen van terugbetaling door de groepsleider op de terugbetaling van de groepslening inderdaad anders is

dan indien deze activiteiten worden uitgevoerd door andere groepsleden. Dit is in het bijzonder het geval wanneer de sociale relaties van groepsleden in acht worden genomen. In theorie kunnen deze sociale relaties worden ingezet om activiteiten van screening, monitoring en het afdwingen van terugbetalingen uit te voeren. Terwijl deze relaties van gewone groepsleden niet bijdragen tot een verhoogde kans op terugbetaling van de lening, is dit wel het geval wanneer het gaat om de sociale relaties van de groepsleider.

De analyse in dit hoofdstuk bevestigt dus dat de groepsleider een bijzondere rol vervult in het groepsproces in de Eritrese MKIs. Het benadrukt daarnaast dat het belangrijk is om meer in detail te bestuderen hoe groepsprocessen de terugbetaling door groepen in MKIs kunnen bevorderen. Voor zover bekend is dit de eerste empirische studie die een dergelijke gedetailleerde analyse heeft uitgevoerd.

De analyse in hoofdstuk 7 borduurt voort op de resultaten van hoofdstuk 6. Terugbetaling door groepen wordt mede bepaald door de mate waarin moral hazard optreedt binnen groepen. Men spreekt van moral hazard indien een groepslid de lening misbruikt. Hiermee wordt bedoeld dat hij/zij de lening gebruikt voor doeleinden die de kans op terugbetaling van de groepslening vermindert. Eén van de vragen in de vragenlijst refereert expliciet aan het voorkomen van misbruik van leningen binnen een groep. De analyse studie in dit hoofdstuk bestudeert de determinanten van misbruik binnen groepen. Daarbij wordt, net zoals in het voorgaande hoofdstuk, vooral aandacht besteed aan processen van screening en monitoring en het afdwingen van terugbetaling binnen groepen. Deze processen zouden volgens de theorie misbruik van groepsleningen moeten verminderen.

De analyse gaat vooral in de op de vraag of, en in hoeverre het effect van monitoring door en sociale relaties van de groepsleider op het verminderen van misbruik van een lening anders is dan indien deze activiteiten worden uitgevoerd door andere groepsleden. De resultaten van de analyse laten zien dat monitoring door en sociale relaties van de groepsleider de kans op misbruik van een lening binnen de groep

vermindert. Dit is niet het geval voor monitoring door en sociale relaties van de andere groepsleden.

Ook de analyse in dit hoofdstuk bevestigt dus dat de groepsleider een bijzondere rol vervult in het groepsproces in de Eritrese MKIs. Het beeld dat naar voren komt is dat van een zogenaamd *delegated monitoring* model. De MKI stelt een tussenpersoon aan, de groepsleider, die de monitoring uitvoert en die daarbij gebruik maakt van zijn sociale relaties met de overige groepsleden. Hierdoor wordt misbruik van leningen verminderd en wordt de kans op terugbetaling van de groepslening verhoogd. De tussenpersoon vermindert daarmee feitelijk de informatieproblemen van MKI, terwijl tegelijkertijd de risico's van lenen aan cliënten worden gereduceerd. De overige groepsleden lijken niet aan het proces van monitoring bij te dragen, althans niet in de zin dat het leidt tot een vermindering van misbruik en/of een verhoging van de kans op terugbetaling van de lening.

Het delegated monitoring model is niet overeenkomstig de meeste theoretische modellen die de werking van groepsleningen beschrijven. Het onderzoek in dit hoofdstuk vraagt om een heroverweging van de bestaande theoretische modellen en te werken aan modellen die alternatieve systemen van groepsleningen, zoals bijvoorbeeld die in Eritrea, beschrijven.

In hoofdstuk 8 wordt het proces van groepsvorming nader bestudeerd. Centrale vraag in de analyse is of individuen met hetzelfde risicoprofiel bij elkaar in één groep komen. Volgens de theorie die bekend staat als de *homogeneous matching hypothesis* zou dit het geval moeten zijn. Deze theorie wordt algemeen geaccepteerd in de literatuur over de werking van groepsleningen.

Alternatieve theorieën komen echter tot een tegenovergestelde conclusie. Ten eerste kan er sprake zijn van zogenaamde *heterogeneous matching* indien er sprake is van *matching frictions*. Hiermee wordt bedoeld dat een individu geen potentiële groepsleden kan vinden met hetzelfde risicoprofiel, bijvoorbeeld omdat deze in het dorp of de regio waarin

hij/zij woont niet of onvoldoende voorhanden zijn. Ten tweede wordt in sommige modellen aangetoond dat heterogeneous matching juist opzettelijk kan worden nagestreefd, namelijk wanneer individuen streven naar het reduceren van het gemeenschappelijk risico (*risk pooling*). Dit is met name het geval indien individuen niet in staat zijn hun individuele risico's te verminderen via verzekeringscontracten vanwege het ontbreken van een goedwerkende verzekeringsmarkt. In veel ontwikkelingslanden, en zeker ook in Eritrea, is dit het geval.

De empirische analyse in hoofdstuk 8 laat zien dat de groepen in Eritrea bestaan uit individuen met een verschillend risicoprofiel. Er treedt dus heterogeneous matching op. Dit resultaat wordt gevonden, zelfs indien rekening wordt gehouden met het bestaan van matching frictions. Deze resultaten suggereren dat groepsvorming in Eritrea, althans voor een deel wordt ingegeven door overwegingen die gerelateerd zijn aan het reduceren van het gemeenschappelijk risico. De informatie die op basis van de vragenlijst beschikbaar is maakt het niet mogelijk om in dit stadium van het onderzoek nadere duidelijkheid te verkrijgen over de werkelijke oorzaken voor de heterogeneous matching van de groepen. Wel maakt de analyse in dit hoofdstuk duidelijk dat de gangbare theorie over groepsvorming heroverwogen dient te worden.

Naar onze mening dragen de empirische studies in dit proefschrift bij aan een verdieping van het begrip over hoe groepsleningen in Eritrea werken. Verder onderzoek op dit terrein dient zich te richten op het bestuderen van vergelijkbare processen van groepsleningen in andere ontwikkelingslanden. Speelt de groepsleider ook een belangrijke rol in MKIs in andere landen? Is deze rol vergelijkbaar met die in Eritrea? Voorts dient nader te worden onderzocht wat de motieven zijn van een individu om als groepsleider te willen fungeren, gegeven het feit dat deze rol de nodige tijd en moeite kost zonder dat daar een directe financiële beloning tegenover staat. Deze vraag is in dit proefschrift onbeantwoord gebleven vanwege een gebrek aan informatie.

Tot slot dient te worden opgemerkt dat onderzoek naar de werking van MKIs in Eritrea zich in de toekomst ook zal moeten richten op het

uitbreiden en verbeteren van de informatie. De huidige dataset bevat informatie voor slechts één jaar. Daarmee zijn panelstudies naar de werking van groepsleningen niet mogelijk. Daarnaast moet meer aandacht worden besteed aan het verzamelen van informatie over variabelen die als instrumenten kunnen worden gebruikt in de schattingen. Beide uitbreidingen van de dataset dragen er toe bij dat de uitkomsten van empirische analyses in de toekomst statistisch betrouwbaarder en robuuster kunnen zijn.